Digital Photogrammetric System

PHOTOMOD

Version 5.3

USER MANUAL

General Information

RACURS

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1. PHOTOMOD system and RACURS Company

PHOTOMOD is a digital system providing full photogrammetric production line from the aerial triangulation to output digital terrain models, vector maps and orthomosaics. PHOTOMOD system contains tools for processing aerial photos and scanner satellite images from different sensors such IKONOS, QuickBird, SPOT, IRS, ASTER, FORMOSAT, CARTOSAT, etc. Due to the system modular structure the user can choose the necessary configuration when purchasing the software. Network system version opens wide opportunities of working with a project simultaneously from several workplaces.

PHOTOMOD system is produced by Racurs Co. (Moscow, Russia) and has been dynamically developing since version 1.3 in 1994. PHOTOMOD's growing user base includes organizations throughout more than 45 countries worldwide. The main fields of application include photogrammetric production, cadastral mapping, cartography and remote sensing, academic photogrammetry, mining, architecture and construction.
You can get the additional information about Racurs and PHOTOMOD from:
Racurs web-site: www.racurs.ru
E-mail: info@racurs.ru
Phone: (+7-495) 720-5127
Fax: (+7-495) 720-5128
Mail: RACURS Co., Ul. Yaroslavskaya, 13-A, office 15, Moscow, Russia

2. Distribution kit

The **PHOTOMOD** system distribution kit includes:

- CD-ROM containing the system setup files and the documentation files in PDF format
- Hard lock key

3. Personal computer requirements

3.1 General recommendations

Computer configuration needed to work with PHOTOMOD system essentially depends on the class and amount of tasks, which will be solved using PHOTOMOD system.

Recommended configuration for comfortable work is shown in the following table:

System Component	Recommended Configuration
Processor	Intel Core 2 Quad @ 3 GHz or equivalent
RAM	4 GB for Win64
Video	Based on NVIDIA Quadro FX 570 or higher
Monitor	StereoPixel LcReflex-20 3D-monitor, Samsung Syncmaster 2233RZ or equivalent with ability to work at a 120Hz frequency
Hard disk	IDE / SATA 1000 GB
Operating System	Microsoft Windows 7

For the hard lock key, an USB port is required (for local PHOTOMOD version) or network connection (for network version).

3.2 CPU

CPU processing power is not too critical for most tasks solved with PHOTOMOD system. If it planned to create large quantity of DTM (TIN, DEM) using correlator, in this case picket computing speed is approximately proportional to CPU speed, and it is recommended to choose the most high-speed model. For most other tasks it is currently recommended to use systems based on Intel Core 2 Duo @ 2.66 GHz or equivalent, and pay greater attention to other system components according to recommendations given in the sections below.

Currently PHOTOMOD system is optimized to work on multiprocessor or multicore systems. Using such systems can significantly reduce the execution time of laborious processes, such as calculation sheets of orthophoto images in PHOTOMOD Mosaic module.

3.3 RAM

RAM volume is critical parameter for most tasks. It's recommended to provide at least 1 GB to work comfortably with medium-size projects (the system is still capable of working with smaller RAM but the performance would degrade significantly due to continuous access to Windows swap file). If you plan to work with large DTMs containing about one million pickets or more, or with large projects (about a thousand images), it is recommended to increase RAM to 2 GB for 32-bit and up to 4 GB for 64-bit operating systems.

3.4 Hard drive

All PHOTOMOD data is stored in storages. In addition, settings, various service and temporary system data is stored in a separate folder, location of which is specified during the installation of PHOTOMOD system and does not necessarily match the placement of system program files. With default performance settings, the free space on the disk containing the service data folder should be at least 1 GB. However user should remember that total amount of disk space required for projects storage, is large enough.

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Hard drive performance in not crucial provided that any up-to-date drive is used. Usually carefully selected operating system settings provide better results then replacing the hard drive with faster one.

SCSI-devices, RAID-arrays, etc., are recommended only if there is a qualified person (system administrator) who will deal with configuration and maintenance. Otherwise, the complexity associated with the problems caused by using that devices can substantially exceed the positive effects of their use.

Since PHOTOMOD system supports automatic distribution of project data on multiple disks, the general recommendation is to use multiple hard drives the average size (~ 500 GB).

3.5 Network adapter

Network connection speed of at least 100 Mbits/sec is required for network processing (when projects are located on remote computers). In the case of simultaneous work of large number (>10) workstations with one server, it's recommended to connect the server to the hub through 1 Gbit network interface.

4. Installation, starting and deinstallation

To install the **PHOTOMOD** system, 400 MB of free hard disk space is required (for program files).

Before the initial installation of **PHOTOMOD** system user should install hard lock key on a local or network station for the installation of **PHOTOMOD** local or network version, respectively. The hard lock key is included in the **PHOTOMOD** distribution kit. See also chapter Protection.

Before the network version installing of the system user should also install or upgrade the **HASP HL** license manager (**lmsetup.exe** file from the **LManager** folder from the PHOTOMOD distribution) on the computer, to which the network key is connected. During the installation process the **NetHasp.ini** standard file will be automatically created on each workstation, where network version to be installed.

Drivers for hard lock key are installed automatically during the local version installing. This may require a reboot of the operating system before the first start of **PHOTOMOD** system. If you have problems with hard lock key drivers installing you can install them manually (by running **HASPUsersetup.exe** file from the **HASP** folder included in the distribution).

To start the installation of **PHOTOMOD** system user should run the setup.exe file, which is part of the distribution kit. All the ne**cessary system settings are made directly to the installation process; to run** PHOTOMOD system user should create at least one profile after the installing (see chapter PHOTOMOD resources system).

The system installing consists of a sequence of steps, each of which is accompanied by instructions in the appropriate dialogue windows. In the event of termination of the installation at any stage, set at this point the program files and data files are not deleted but to complete the installation you should run the installer and go through all the steps again.

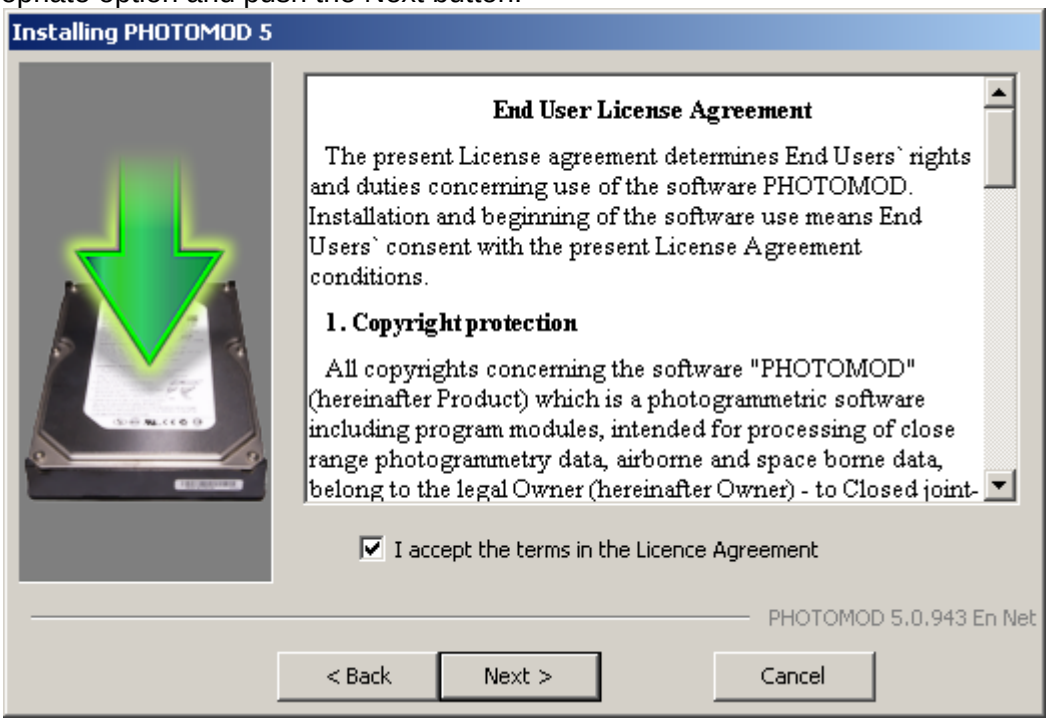
The process of **PHOTOMOD** initial installation consists of the following steps:

Preparation stage

• **Step 1**: Welcome and warning. Push the **Next** button

Installing PHOTOMOD 5
Welcome to the PHOTOMOD 5 installation program.
It is recommended to close all running programs before continuing installation.
WARNING: This product is protected by copyright laws.
Unauthorized copying and/or distribution of this product or any of its parts is prohibited.
PHOTOMOD 5.0.943 En Net
< Back
Next >
Cancel

• **Step 2**: Read the license agreement. If you agree with it, check the box opposite the appropriate option and push the Next button.


Installing PHOTOMOD 5
End User License Agreement
The present License agreement determines End Users` rights and duties concerning use of the software PHOTOMOD. Installation and beginning of the software use means End Users` consent with the present License Agreement conditions.
1. Copyright protection
All copyrights concerning the software "PHOTOMOD" (hereinafter Product) which is a photogrammetric software including program modules, intended for processing of close range photogrammetry data, airborne and space borne data, belong to the legal Owner (hereinafter Owner) - to Closed joint-
I accept the terms in the Licence Agreement
PHOTOMOD 5.0.943 En Net
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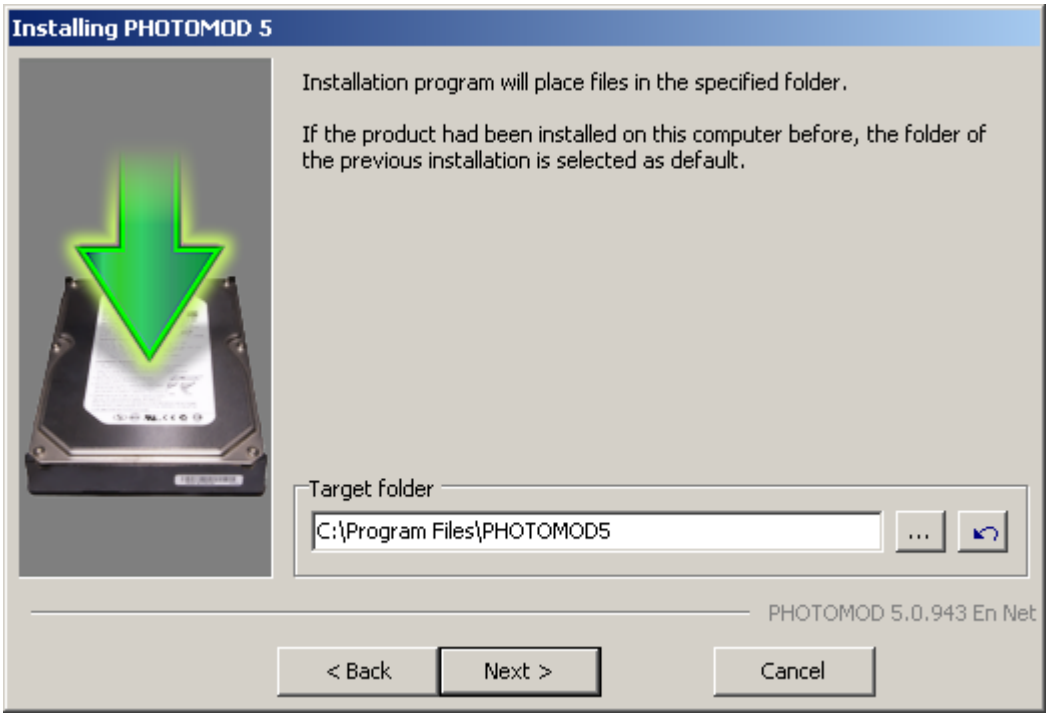
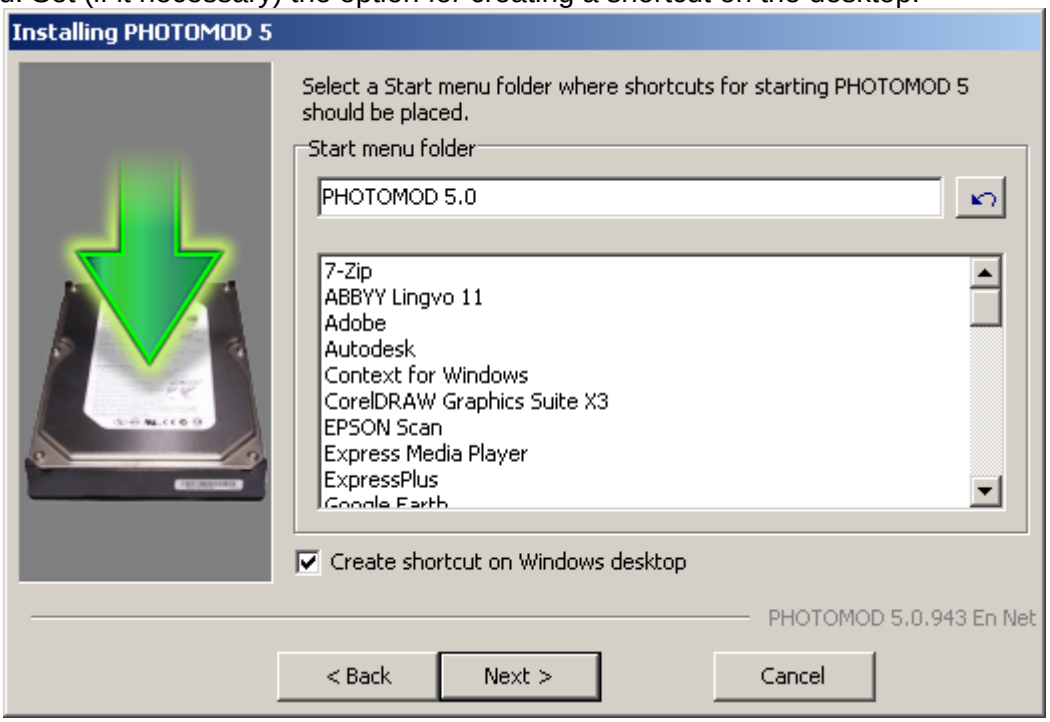
Next >
Cancel

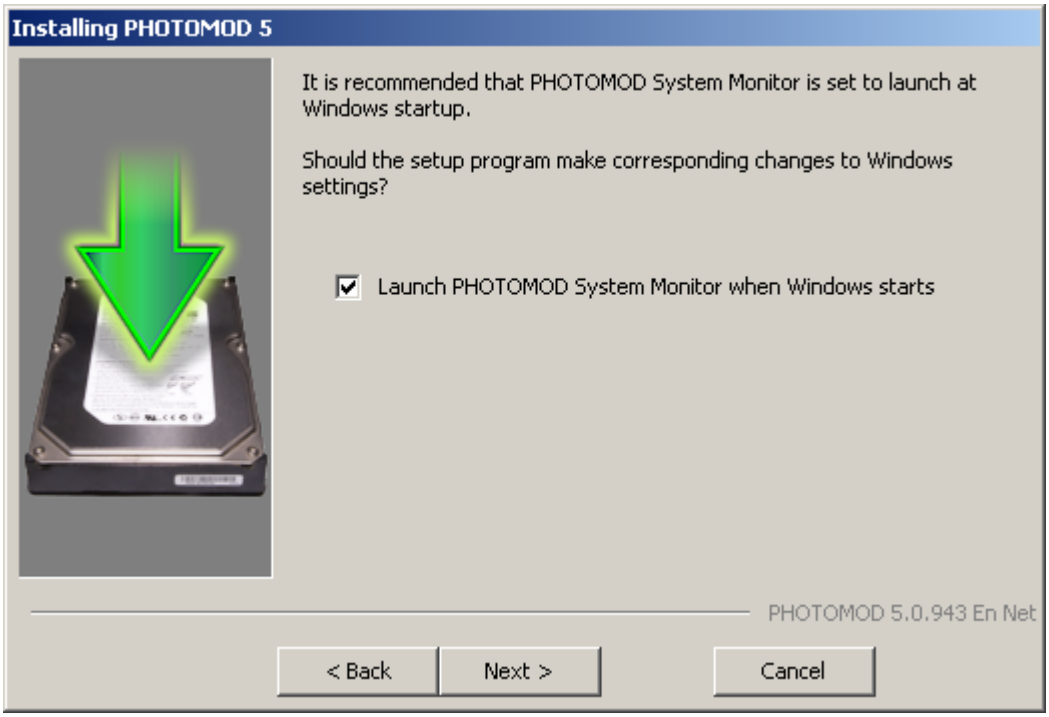
• **Step 3**: Select the target folder to install the program files of **PHOTOMOD** system (C: \ Program Files usually).


Installing PHOTOMOD 5
Installation program will place files in the specified folder.
If the product had been installed on this computer before, the folder of the previous installation is selected as default.
Target folder
C:\Program Files\PHOTOMOD5
...
PHOTOMOD 5.0.943 En Net
< Back
Next >
Cancel

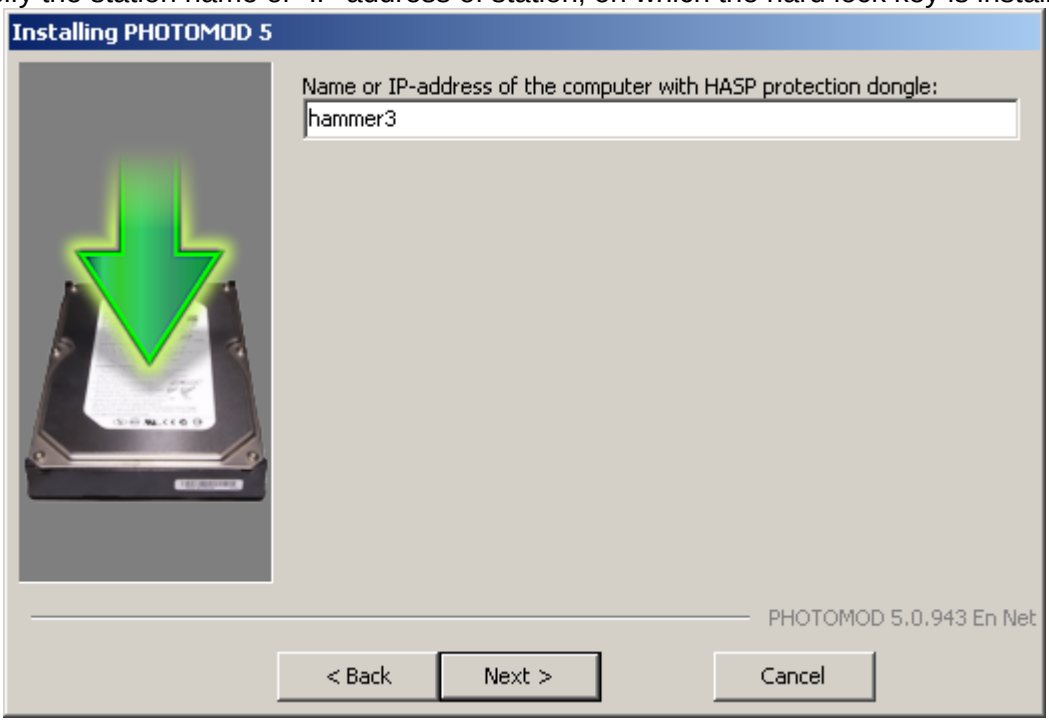
• **Step 4**: Select the folder name for the **PHOTOMOD** programs / modules in the **Start** menu. Set (if it necessary) the option for creating a shortcut on the desktop.



• **Step 5**: Turn on the appropriate option (if it necessary) to run the System Monitor. See chapter PHOTOMOD System Monitor module.

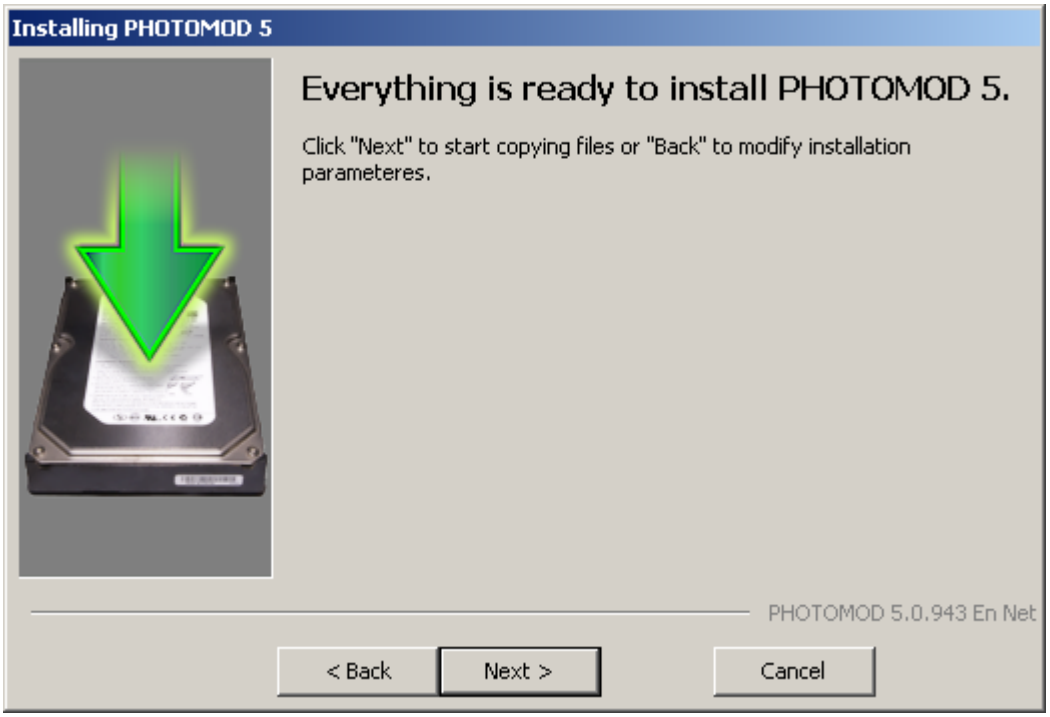

Installing PHOTOMOD 5
It is recommended that PHOTOMOD System Monitor is set to launch at Windows startup.
Should the setup program make corresponding changes to Windows settings?
Launch PHOTOMOD System Monitor when Windows starts
PHOTOMOD 5.0.943 En Net
< Back
Next >
Cancel

• **Step 6**: (for network version): in the case PHOTOMOD network version installing specify the station name or IP-address of station, on which the hard lock key is installed.

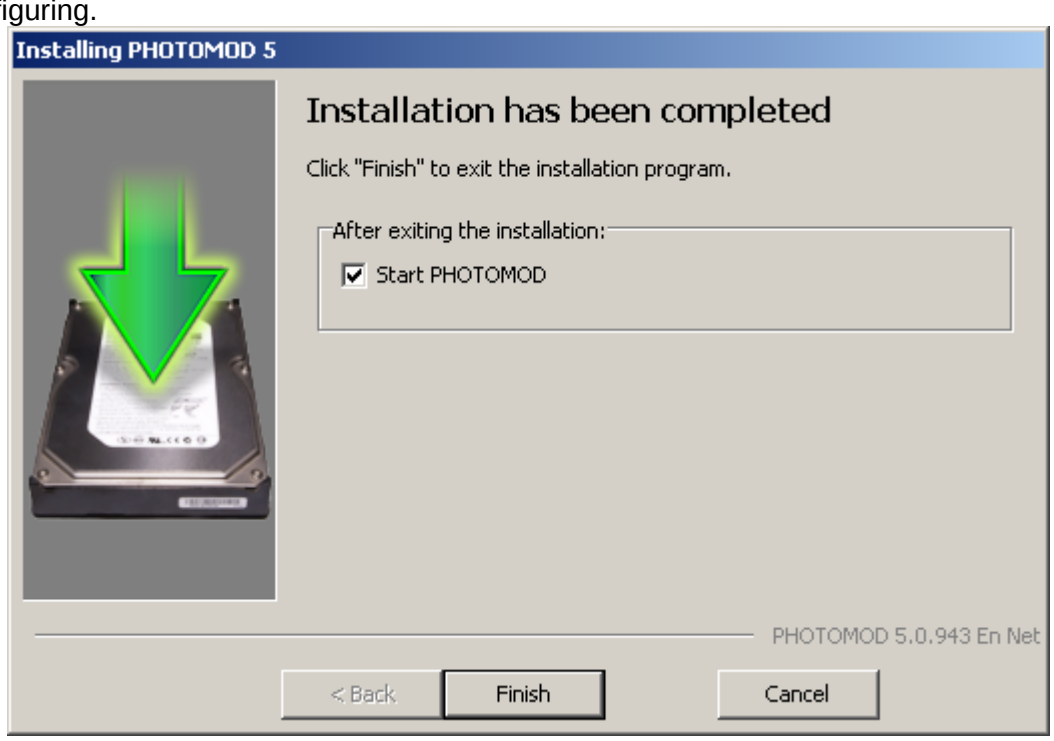


File copy stage

• **Step 7**: Everything is ready for PHOTOMOD installation - in the next dialogue window push the Next button to copy program files. The installation process starts.


Installing PHOTOMOD 5
Everything is ready to install PHOTOMOD 5.
Click "Next" to start copying files or "Back" to modify installation parameteres.
PHOTOMOD 5.0.943 En Net
< Back
Next >
Cancel

• **Step 8**: After the installation, push the **Finish** button to move on to the system configuring.

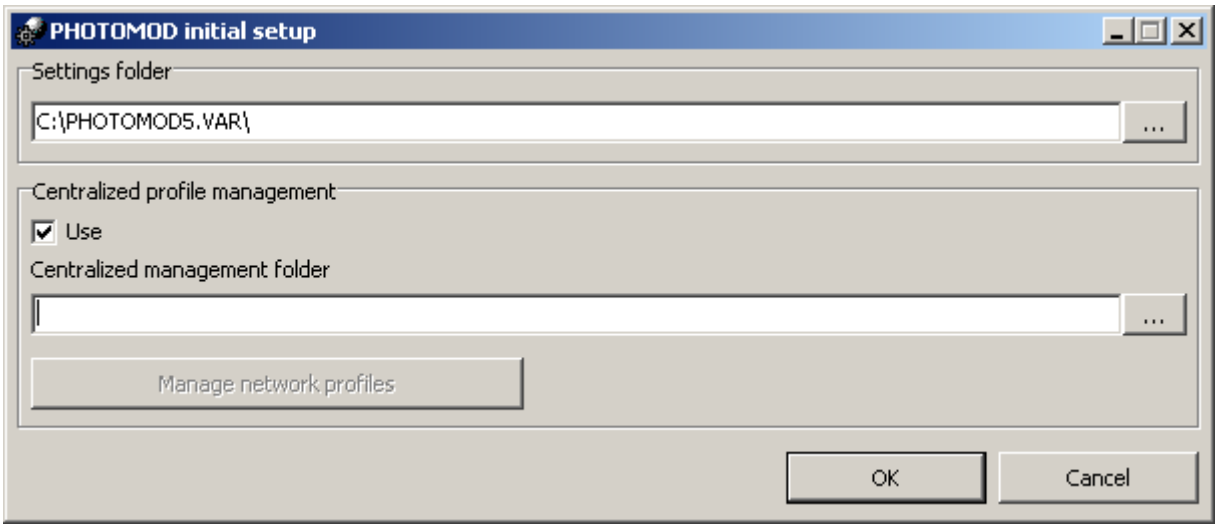


If hard lock key is not found, the appropriate message is displayed. Set the hard lock key on local station or on a specified (in Step 6) network station (during the network version installing) and run PHOTOMOD.

If the installer does not find the **PhConsts50.dll** file, or it does not comply with hard lock key (see also chapter Protection), the appropriate message is displayed. Contact to technical support service of Racurs Company to get the file **PhConsts50.dll**. Close the **System Monitor** (if it was opened) and copy this file into the PHOTOMOD program folder. Then restart **PHOTOMOD**.

System configuration stage

• **Step 9**: After the starting of PHOTOMOD system the window for the initial settings is displayed:



Specify a folder for configuration files storing (by default PHOTOMOD5.VAR in the root folder, to which was installed PHOTOMOD system). It is not recommended to place this folder on a network drive, because this can significantly slow down the system.

• **Step 10**: Next, user should create at least one profile: a network profile by pushing **Manage network profiles** button (having centralized management folder connected) or a local profile (by pushing **OK** button) in the **Control Panel** window. See chapter PHOTOMOD resources system. Activate the profile and push the **OK** button to open the PHOTOMOD system.

To uninstall PHOTOMOD system use the **Start | Programs | PHOTOMOD | Uninstall PHOTOMOD** menu command or use the standard procedure of uninstalling programs in the **Control Panel** of **Windows**, having closed all running modules previously.

Instructions for updating the **PHOTOMOD** system of 4.x versions are on the official website of Racurs Company http://www.racurs.ru/

To install the distributed processing system perform the following:

1. After the system installation run the **Ph_Rus_Net_pp-32.exe** or **Ph_Rus_Net_pp-64.exe** file for 32 or 64-bit OS Windows version respectively. **The Welcome** window opens.
2. Repeat the installation steps.
3. At the stage of installing the application opens window for processing projects in distributed processing mode.

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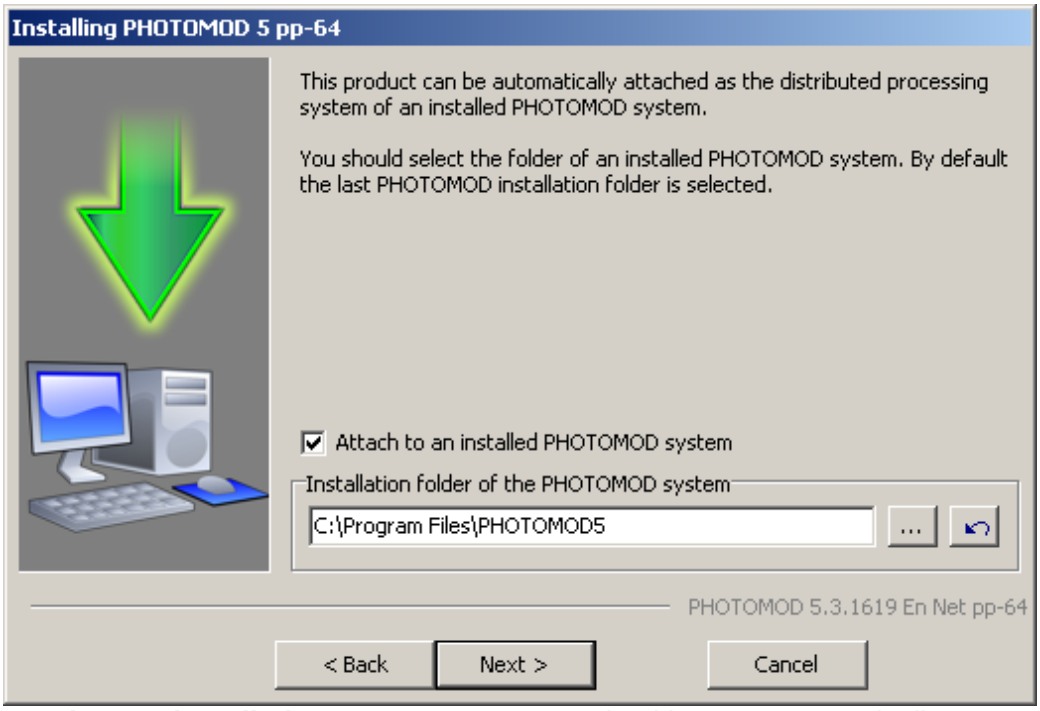

Installing PHOTOMOD 5 pp-64
This product can be automatically attached as the distributed processing system of an installed PHOTOMOD system.
You should select the folder of an installed PHOTOMOD system. By default the last PHOTOMOD installation folder is selected.
Attach to an installed PHOTOMOD system
Installation folder of the PHOTOMOD system
C:\Program Files\PHOTOMOD5
...
PHOTOMOD 5.3.1619 En Net pp-64
< Back
Next >
Cancel

The **Attach to an installed PHOTOMOD system** checkbox set automatically.

4. [optional] In the **Installation folder of PHOTOMOD system** is shown the folder with the installed system. Change the target folder if you need.
5. Click the **Next** button to continue installation. The distributed processing system adds to the installed PHOTOMOS system.

5. Workflows

There are two versions of PHOTOMOD system - *local* and *network* ones.
In case of *local version*, a set of all required modules and local key should be installed to a separate workstation. Local processing is advisable in case of small-scale projects, which use *local profiles*. See chapter PHOTOMOD resources system to learn more about the resources system. See chapter Local processing to learn more about local processing.

It is recommended using *network version* for large volume photogrammetric works, which require simultaneous participation of several operators.
The network configuration of the PHOTOMOD system is preferable in most cases - it allows organizing operators' work more flexibly and to use production capacity more efficiently.

In this case, *network profiles* should be created in a special folder to provide storage for project recourses. The resources can be placed on any network drives. Each computer involved into co-operative processing should be set up to have access to this folder. See chapter PHOTOMOD resources system to learn more about the resources system. See chapter Network processing to learn more about network processing.
In the chapter Protection see also the description of the installation and configuration of protection for local and network versions.

6. Protection

The **PHOTOMOD** system is protected by **HASP** hard lock key from **Aladdin Co**.

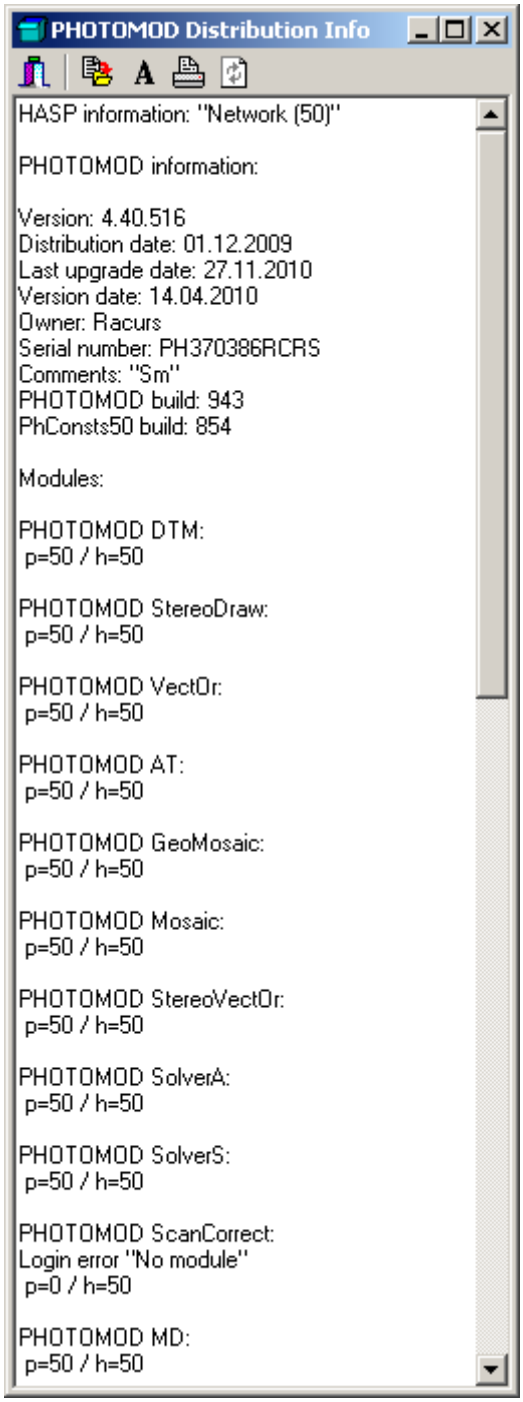
There are *local* and *network* versions of the **PHOTOMOD** system, differing in licensing conditions for modules and subsystems.
According to mentioned above, there are some features of the installation and setup of hard lock key to work with local and network versions of the **PHOTOMOD** system.

In the case of the *local version* the installation package and hard lock key of the PHOTOMOD system must be installed on individual workstations. The hard lock key drivers are installed automatically along with the local version of **PHOTOMOD** system. It might require a reboot of the operating system before the first start of PHOTOMOD system. In case of any errors corresponding with the system protection try to install key drivers “manually” by running of **HASPUsersetup.exe** from **HASP** folder on your installation CD.
In case of network PHOTOMOD version the driver is not installed on workstations, however you should install license manager (**lmsetup.exe** file from **Lmanager** folder). The license manager must be installed on the PC the hard lock key is attached to.

Please note that work in **PHOTOMOD** network version impacts considerably on resources of the computer where network hard lock key and License manager have been installed. That is why hard lock keys producer (Aladdin company, www.aladdin.ru) recommends to install the key on the isolated machine, where (CD/DVD recording, for instance) are not launched.

You should keep in mind that HASP HL licence manager impacts considerably on computer resources. That is why resource-intensive tasks (CD/DVD recording, work in PHOTOMOD, etc.) on computer with network hard lock key installed may lead to failure of protection system, followed by disturbances in work with PHOTOMOD system on working stations up to data loss. It is recommended to install network hard lock on isolated machine, where resource-intensive tasks are not launched.

As a result, each installation package of the PHOTOMOD system has the unique HASP hard lock key. Connection with the hard lock key is performed using by PhConst50.dll file, which is copied to the PHOTOMOD folder upon installation. So the system will only operate if the hard lock key is accessible and it corresponds to the PhConst50.dll file. If the hard lock key does not match the file, error message from protection system will be displayed. Right click the **Licence info** (on the popup menu which opens by right clicking on the icon) menu item to check if the key is valid for the file. **PHOTOMOD Distribution info** window opens during the command. Information about the features updates of PHOTOMOD previous versions can be obtained from the technical support service "**Racurs**" company, as well as on the www.racurs.ru.

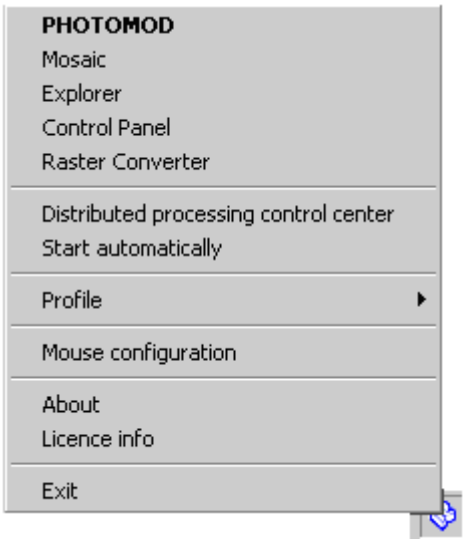


Licence info

Licence info window will open as a result of executing menu command. You can see the key ID in the Serial number line. It must match the number on the label, which is glued on the key. In addition, the number of licenses for a particular module of the system, written directly to the hard lock key (p) and thePhConst50.dll file (h) must also be identical. Otherwise, you should contact the **RACURS Company technical support service**.

7. PHOTOMOD System Monitor module

After **PHOTOMOD** system installation **PHOTOMOD System Monitor** module is launched. It is visualized in OS Windows System tray as an icon . If the module was not launched for some reason, you should start PHOTOMOD Core from Windows Start menu: **Start | Programs | PHOTOMOD | PHOTOMOD 5.0**.



Pop-up menu of **PHOTOMOD System Monitor**

Context menu of **PHOTOMOD System Monitor** module is opened after right click on the icon and contains the following commands:

- **PHOTOMOD** – starts the PHOTOMOD system (also is launched using double click on the icon) and afterwards starts the work in PHOTOMOD system
- **Mosaic** – to start the PHOTOMOD Mosaic module for Othomosaic building
- **Explorer** – to start the program for working with the resources of active profile (see the chapter PHOTOMOD Explorer)
- **Control Panel** – to start the program for PHOTOMOD resources system management (see the chapter Control Panel)
- **Raster Converter** – start Raster Convert (see the chapter PHOTOMOD Raster Converter)
- **Distributed processing control center** – allows to setup options and to control distributed processing
- **Start automatically** – an option to start **Distributed processing control center** automatically with **PHOTOMOD System Monitor**
- **Profile** – allows to select an active profile in the list of local (h) and network (R) profiles;
- **Mouse configuration** – allows to setup a configuration of mice or other special devices (like hand wheels/foot pedals), which are used for images stereo processing (see the chapter Mice and hand wheels adjustment for stereo processing)
- **About** – opens a window indicating the number of system build and serial number of hard lock key
- **Licence info** – opens a window with information on PHOTOMOD modules configuration and hard lock key ID. You can save the information to text file and send it to tech. support service

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- **Exit** – closes **PHOTOMOD System Monitor** module and exits from **PHOTOMOD** system.

8. PHOTOMOD resources system

Resources system, implemented in **PHOTOMOD** system, is focused primarily on **cooperative processing data using network configuration**. Providing convenient access to all data, related to a particular projects group and located in the network in an arbitrary manner, without having to perform unnecessary operations with network files - is the main advantage. On the other hand, the resources system is a flexible and open, and allows to organize the data placement optimally for a specific task.

PHOTOMOD resources system includes the following key concepts:

Profile is an independent group of resources, related to one project or projects group.
Virtual folders is a mechanism for creating a branched structure of profile resources.
Folders and storages are **virtual folders types**.
Profile defines resources configuration. Profile has a virtual name and does not correspond to the actual file system. Profile name is a *root* of resources tree, and all the branches of profile resources are attached to it. It's possible to place profile resources on any workstation and network drives. It's recommended to create one profile for resource allocation of one project or independent group of projects.

There are two types of profiles: *local* and *network* profiles. Local profile is accessible only from the workstation where it's stored. Network profile is accessible on multiple workstations to provide cooperative processing of one project.

Network profile is defined by system administrator in a central repository, and also is accessible to workstations users. When a network profile is selected on workstation, it is configuration is automatically copied to local computer, which provides independent processing when the repository is inaccessibility.

Only one (*active*) profile is accessible in a **PHOTOMOD** session. One can select any accessible network or local profile as the active one.

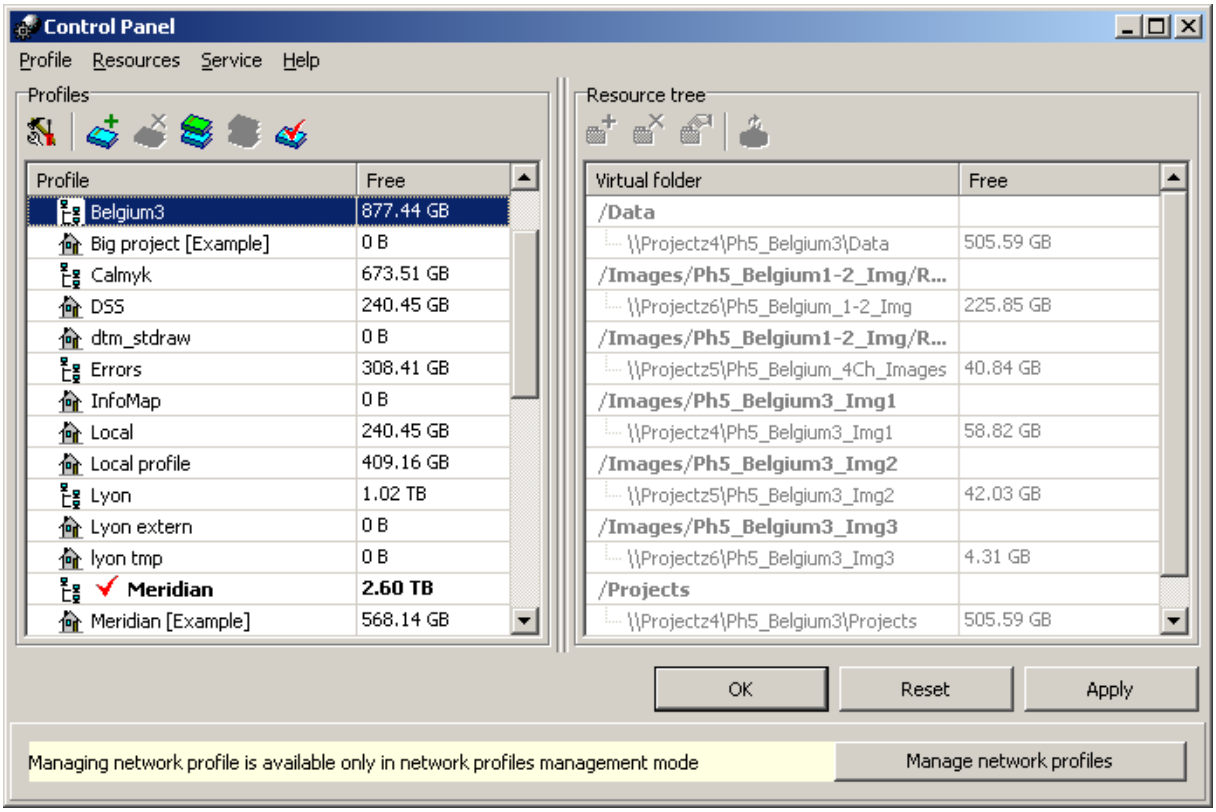
All branches of upper level of tree resources are *virtual folders*. Virtual folders are virtual names of real network or local folders (drives) or groups of folders selected by user for allocation of profile resources. Thus, one profile can use disk space of several computers. Using virtual folders it's possible to connect to resources tree the resources of two types: regular file system folders and *storage folders* (*group of storages*). See chapter Storages. Storages are special type of virtual folders. Resources are placed in the storage automatically; i.e system selects storage of the group, on the basis of the analysis of free space. Thus, storages allow to optimize multiple disks usage for storage resources, which is a constructive solution for network processing of large projects. See chapter Distribution of resources on servers.
For connecting real folders to resources tree it's sufficient that they are available for reading.

Profile resources system includes all subfolders and files from each regular folder (drive) (except files with *. meta extension), for which virtual folder is specified. Files with *.meta extension store metadata and are not resources.
See also chapter Creating resources system.

All the configuration files, which describe a set of local profiles created and their structure, are stored in PHOTOMOD5.VAR configuration folder. See chapter PHOTOMOD5.VAR configurations folder.

Control Panel program is used to create and manage profiles. Control Panel window allows to create and edit profiles, connect virtual profile folders, create/connect a repository of network profiles, select an active profile, etc.

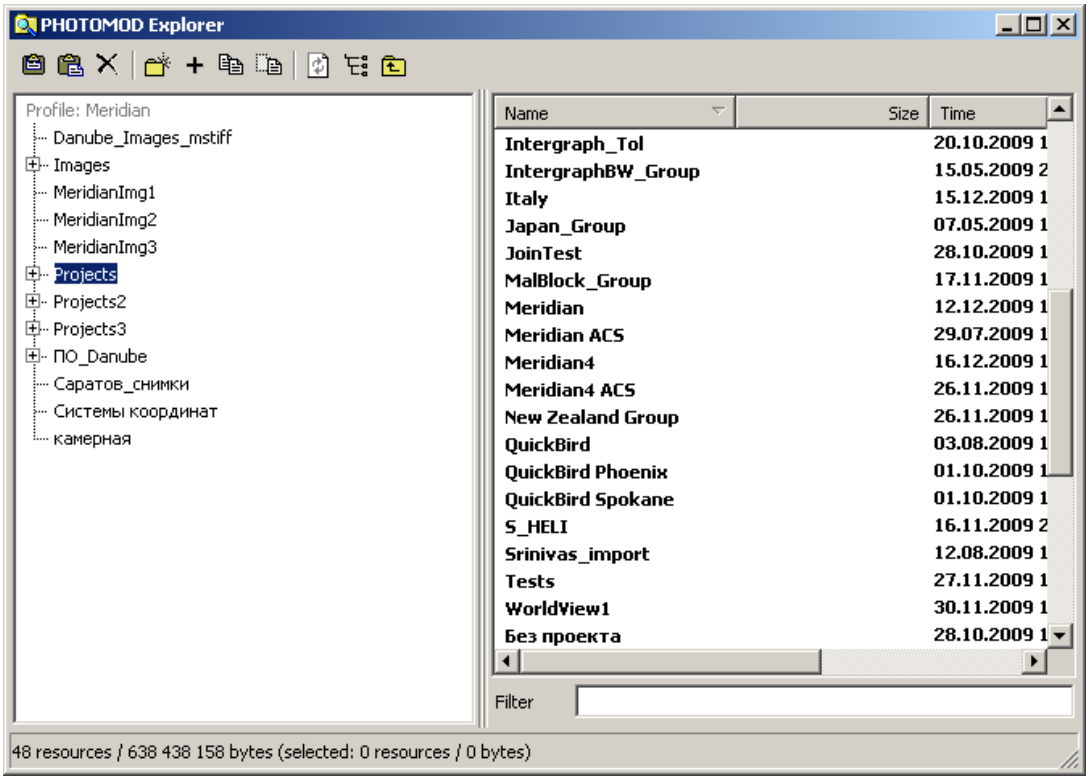
See also chapter Control Panel.



Control Panel window

How to create and manage network profiles is described in chapter Creating and connecting network profiles. Besides, there is a separate program named PHOTOMOD Explorer for handling resources. Program displays all resources of the active profile - all contents of virtual folders (subfolders and files) - and allows to edit the structure of resources.

See chapter PHOTOMOD Explorer.



PHOTOMOD Explorer program

8.1 PHOTOMOD5.VAR configurations folder

Unlike the PHOTOMOD installation folder (usually C:\Program Files\PHOTOMOD5), which does not contain any modified files, a separate **PHOTOMOD5.VAR** folder (usually C:\PHOTOMOD5.VAR), which is also created upon system installation, is intended for storing all variable data, not related to the resources system. Folder path is stored in the registry.

PHOTOMOD5.VAR folder is used for storing various configuration files, temporary files and other files. **PHOTOMOD5.VAR** folder is the same for all installed PHOTOMOD modules on workstation, regardless of a number of **PHOTOMOD** copies.

PHOTOMOD5.VAR folder also contains sets of configuration files related to profiles. Each profile has a separate corresponding subfolder. All variable data in **PHOTOMOD5.VAR** folder is divided into common data and specific profile related data. All configuration files are in XML format.

Let's discuss the structure of **PHOTOMOD5.VAR** folder in more details. **PHOTOMOD5.VAR** folder contains:

- **Policy.x-ini** file with the most common configuration settings, for example, active profile name, name and location of central repository connected, etc.
- **AutoSave** folder for storing autosave data.
- **Config** folder for storing the settings files, which are common for all profiles.
- **Logs** folder for storing log files, which are common for all profiles.
- **Profiles** folder for storing all data related to specific profile, a list of local and network profiles corresponding to a list in Control Panel. Configuration file, which corresponds to a specific profile, describes the structure of profile resources tree - a list of virtual folders and absolute paths to real local / network folders or repositories.
- **Tmp** folder for storing temporary data.

- **UserData** folder for storing various types of user data outside the resources system.

8.2 Storages

Storage or *group of storages* can be used as a virtual folder in profile resources tree.

Placing resources in storage is performed automatically without user intervention, which allows optimal usage of all disk space available. System analyzes free space on disks containing storages and distributes data to these storages evenly. Thus, it makes no sense to place more than one storages to one disk.
The number of storages, which correspond to one virtual folder, should not exceed 16.

Storage is a regular folder, which contains auxilliary files and Content subfolder at its root. Thus, repository is a folder for storing resources and a table file (**$PhStorage.list**), which contains the list of resources in the repository.

When you create a folder in the virtual folder, which contains several repositories, these folders are created in all storages in the Content folder, i.e all storages will have the same structure and the same physical folders.
However, contents of these folders are different, because a resource could be presented in only one storage of the group.
Besides the table (**$PhStorage.list**), repository root also contains **$PhStorage.x-ini** file, containing information about the repository, as well as temporary files, which are used to lock storage table for read / write operations.
Storage ID in resources system is written into **$PhStorage.x-ini** file, as well as a list of ID's of all other storages of the group.

This information is checked when virtual folder is initialized.
An additional point is that this storage format allows to relocate data easily between repositories. One should just relocate necessary files and delete storage tables.
New **$PhStorage.list** table will be created automatically on the next attempt to access the virtual folder using the interface for working with resources.
Metadata for each resource are stored in file with resource name and *.meta extension.

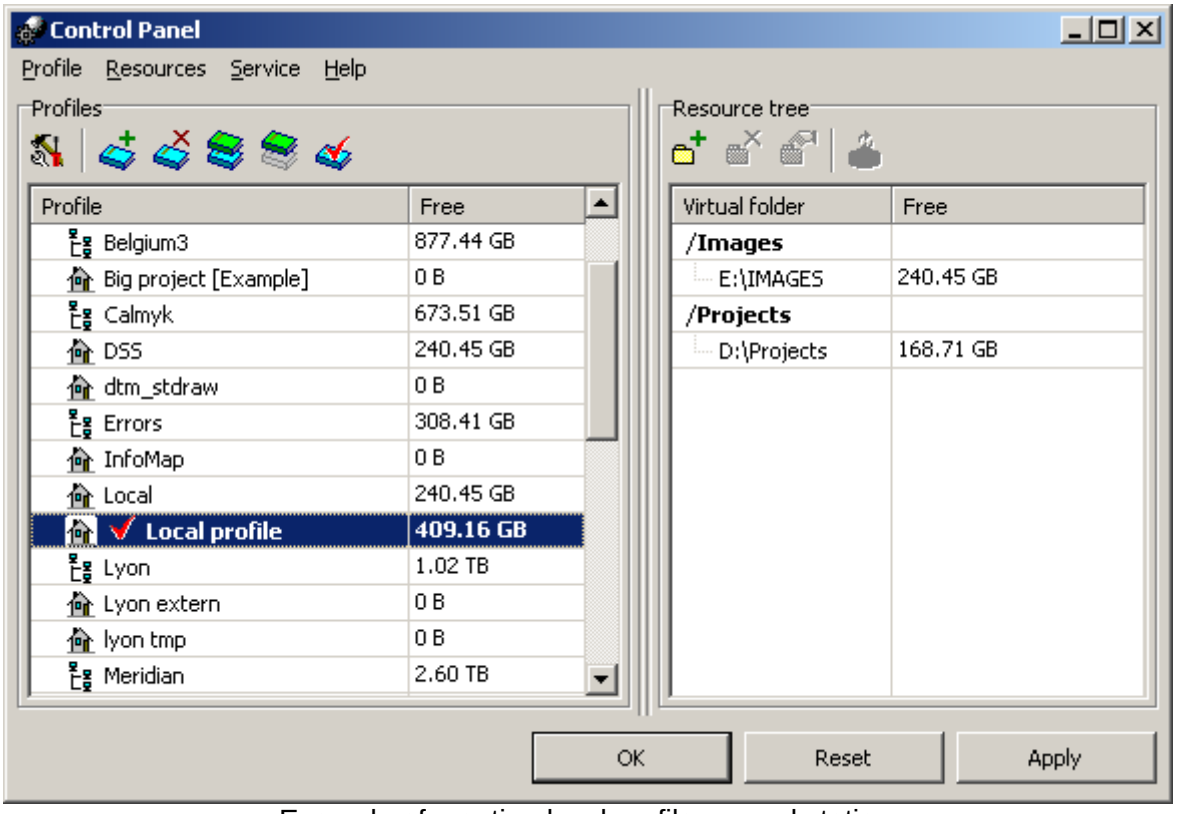
Metadata file is always located in the same repository as the resource.
See chapter Distribution of resources on servers for an example of organization of work using repositories.
Description of connecting new or existing storages is located in chapter Virtual folders connecting.

9. How to work

9.1 Local processing

In case of local work (i.e. if there is only one **PHOTOMOD** workplace, or only one operator works with each project, and data exchange is not required between workstations) it is recommended for each workstation to organize custom *local profile* with all the resources, which allows to fully use the advantage of faster local disk access as compared to network access (i.e. when virtual folders of local profile are located on disks of other workstations).
See also chapters PHOTOMOD resources system and Creating resources system.

In the following example the *InfoMap* local profile with two virtual folders for resource allocation (for project files and images) is created. The same workstation's local disk contains both folders.



Example of creating local profile on workstation

9.2 Network processing

Data (projects) storage system, focused on distributed network processing, is one of the distinguishing features of **PHOTOMOD** system.
In case of network processing of projects (working with profile) it is performed simultaneously by multiple operators from multiple workstations.
Implementation of network processing involves several options, which have their advantages and disadvantages.
See chapters Distribution of resources on workstations and Distribution of resources on servers.

9.2.1 Distribution of resources on workstation

Profile resources can be located on several workstations in local network. Any number of profiles can be created in a network. All folders used for storing data should be open for public access to read-write.

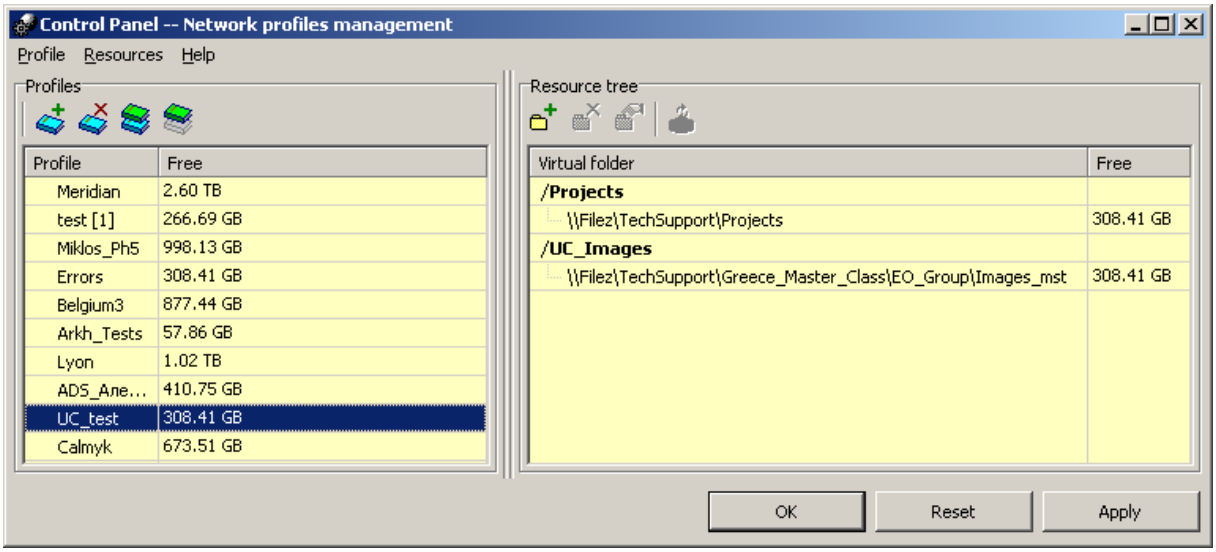
Recommendations include:

- It's strongly recommended to store the resources on a separate computer (or computers) which is not used as a workstation to avoid resource data access failures caused by the workstation software failures.
- It is also recommended to distribute resources to different disks, to use the available disk space efficiently.
- It is also recommended to install hard lock key on a separate computer, which does not has resource-intensive tasks, which can lead to failures in protection and failures of **PHOTOMOD** processing on workstations.

For simultaneous editing of the same files there is always a rule, except for explicit messages and warnings, - the rule of "the last saved data is stored". There is no limitation for browsing, it's allowed to simultaneously open the same project files in any number on multiple computers.

The best way to organize network-based workflow using network computers to store resources is as described below:

1. Create a central control folder on any workstation. Configure read-write network access to that computer.
2. Create network profile in this repository (or multiple network profiles) and setup resources configuration of each profile. Connect the virtual folders.
3. Configure the usage of central control folder on the all workstations. All network profiles, for which configurations are stored in central control folder, will be available on workstations (which are displayed in Control Panel's profiles list). Select network profile for working and activate it. Then restart all open **PHOTOMOD** modules for changes to take effect. See also chapter Creating resources system.



Example of creating network profile on workstation

9.2.2 Distribution of resources on servers

This option is most appropriate for working with network projects. It is recommended to have dedicated file-servers, which are not used as workstations.

It is strongly recommended to pay attention to choosing and configuring of the OS during the preparation of the computer as file-server for network processing. It is recommended to use FreeBSD for this purpose; less preferable operating systems are Microsoft Windows Server or Linux. Our tests have shown that these operating systems are the best server platforms for photogrammetric processing. It is strongly recommended to consider, that Windows (XP, Vista, 7) OS has a limited number of simultaneous network connections to computer, if it is planned to placing data on computer with "no server" version. Simultaneous work will be difficult, if number of workstations in network exceeds 8.

Emphasis is placed on reliability storage subsystems. Due to the fact that the license manager requires a lot of system resources, it is recommended to connect the HASP key to a dedicated computer.

The proposed configuration of network may to look as described below.

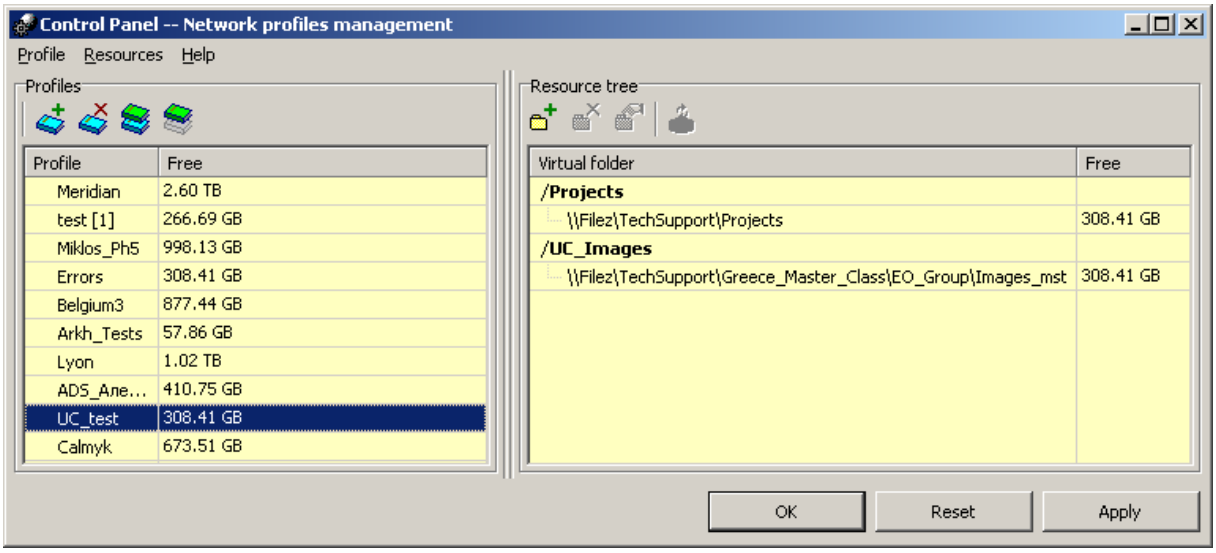
Preferred is an option of data placement when profile resources are located in multiple virtual folders (in accordance with the volume), which are on different servers.

It is better to follow the rule "One disk is one virtual folder". In case when distributed processing is performed using many workstations and a single profile, provided is more uniform load distribution on aggregate bandwidth of disk system of servers and network.

Consider several examples of recommendations, how to organize of the network processing using file-servers.
A small project (or *group of projects*) can be processed as described below:

1. Create a network profile with a centralized directory server. Select one drive or folder server (depending on project size) and define the virtual directories to store resources and define the virtual directories.
2. Connect created network profile to all workstations, which will participate in network processing. To do this, specify central control folder in initial setup of each workstation, select network profile and make it active. Then restart all open **PHOTOMOD** modules, the changes to take effect. See also chapter Creating resources system.

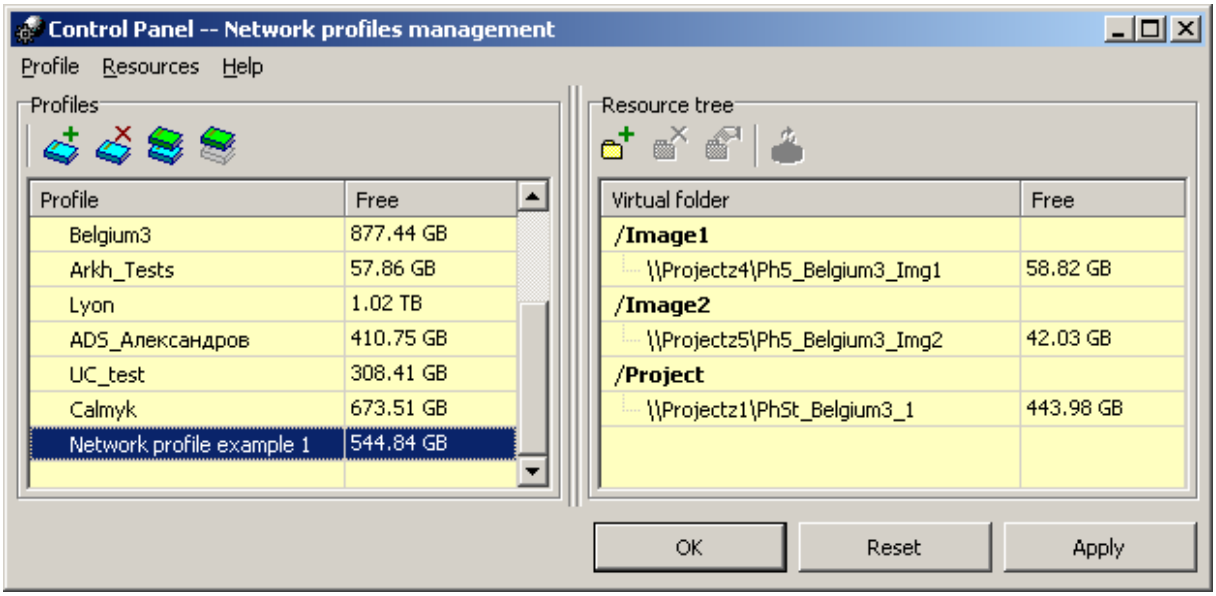
This data organization is convenient in terms of easy backups (all resources is placed in the same place), and there is no loss in speed while simultaneous processing of small volumes.



Example of creating network profile using one server drive to store resources

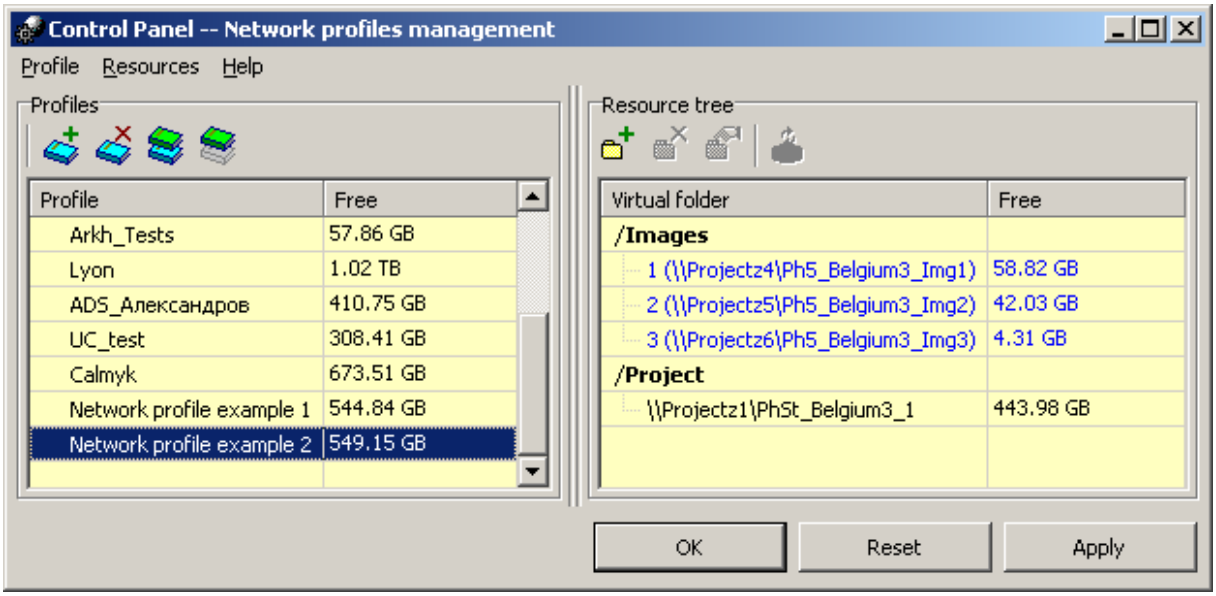
If the project (or group of projects) assumes large volumes, it is best to use to place resources multiple file servers; Use several different server drives.
It's a good idea to allocate resources so that it would be convenient to backup it. Two strategies of resources allocation on the servers are recommended:

Strategy 1. Connect different server drives (folders) as virtual folder to store images, and separate server drives to store projects. Administrator involvement is desirable for organization of such structure and to monitor availability of free space on server drives.



Example of creating network profile using different server drives to store images and separate network profile for project files

Strategy 2. Select different server drives (folders) as storages to place images and connect that group of storages to profile, using virtual folder. It is recommended to select separate server drive (s) as virtual folder to store projects. In this case all storages connected using virtual folder will be filled with data automatically. PHOTOMOD system analyzes free space in storages and distributes resources to store. This strategy is preferable, because it allows to use all storage space, allocated for images. And also facilitates administrator work.



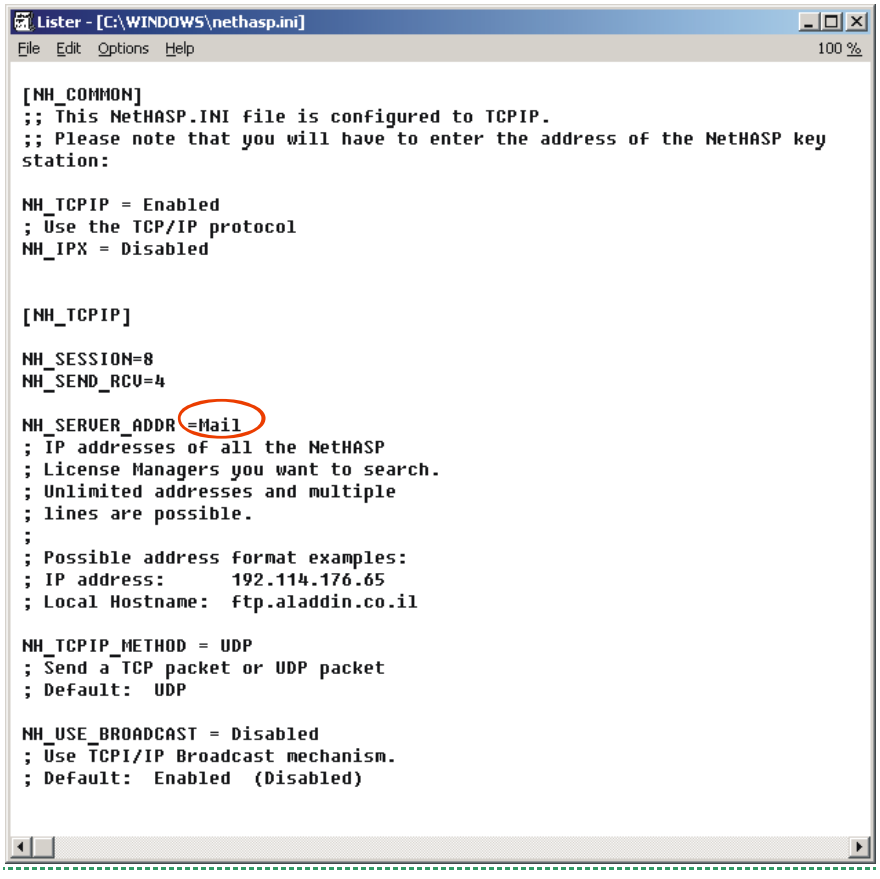
Example of creating network profile using group of storages for images and separate server for project files

Connect network profile, created by one of the above strategies, to all workstations, which will participate in network processing. To do this, specify central control folder in initial setup of each workstation, select network profile and make it active. Then restart all open PHOTOMOD modules, the changes to take effect. See also chapter Creating resources system.

9.2.3 Setup resources data access

Network data access is only implemented using operating system (network access to files and folders). It is strongly recommended to meet following requirements when network processing is performed:

1. Network access must be permitted to profile resources with full permissions for all users, who work with them.
2. Group of storages connected to different workstations, should be matched or do not intersect. If there are storages A,B and C in the network, and the storages A and B are connected at a workstation, all the other workstations should use only the storages A and B or only the storage C. Connecting the storages B and C only (without the storage A) at any other workstation may cause problems.
3. All profile resources connected to workstation should be available while working with **PHOTOMOD** system on this workstation.
4. All changes in structure of profile resources, which performed using Control Panel, are available for running **PHOTOMOD** modules only after restart of these modules.
5. If local network contains a server, where **PHOTOMOD** profiles are created, it is necessary to control number of users accessing it simultaneously. There are limitations to simultaneous access in non server operating systems (for example Windows, 2000/XP). In this case recommended number of operators working with server storage is not more than 7. It is recommended to use FreeBSD, Linux or MS Windows Server server operating systems.
6. It is also recommended to install hard lock key on a separate computer, which does not has resource-intensive tasks, which can lead to failures in protection and failures of **PHOTOMOD** processing on workstations.
7. Installer stores NetHasp.ini file to Windows OS program folder (usually C:\Windows) during installation of network version of **PHOTOMOD** to workstation. This file contains *computer name*, where the HASP hard lock key is installed. If hard lock key has been moved to another computer, it is necessary to replace previous computer's name with a new one or IP address in the appropriate line of the ini-file. All running **PHOTOMOD** modules must be restarted after changing the ini-file.


Lister - [C:\WINDOWS\nethasp.ini]
File Edit Options Help
100 %
[NH_COMMON]
;; This NetHASP.INI file is configured to TCPIP.
;; Please note that you will have to enter the address of the NetHASP key
station:
NH_TCPIP = Enabled
; Use the TCP/IP protocol
NH_IPX = Disabled
[NH_TCPIP]
NH_SESSION=8
NH_SEND_RCV=4
NH_SERVER_ADDR =Mail
; IP addresses of all the NetHASP
; License Managers you want to search.
; Unlimited addresses and multiple
; lines are possible.
;
; Possible address format examples:
; IP address: 192.114.176.65
; Local Hostname: ftp.aladdin.co.il
NH_TCPIP_METHOD = UDP
; Send a TCP packet or UDP packet
; Default: UDP
NH_USE_BROADCAST = Disabled
; Use TCPI/IP Broadcast mechanism.
; Default: Enabled (Disabled)

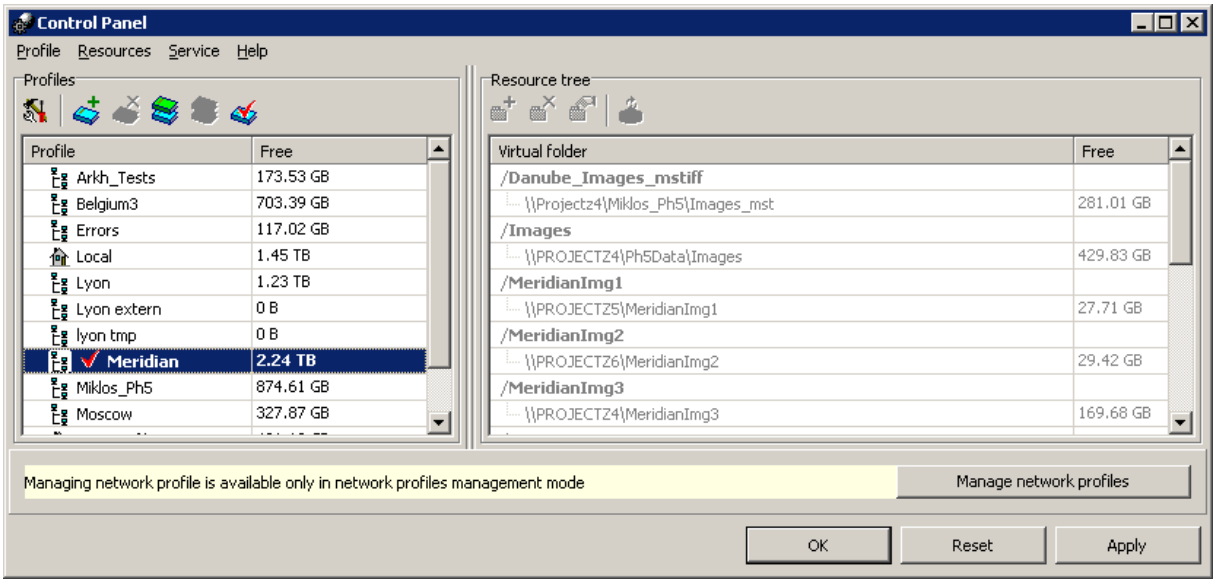
Example of nethasp.ini file

The figure displays an example of nethasp.ini file, and computer name with hard lock key is highlighted in red.

10. Creating resources system

10.1 Control panel

Control Panel program is used to arrange a structure of resources for working in **PHOTOMOD** system. Use the following way to start **PHOTOMOD Control Panel**: **Start | Programs | PHOTOMOD | PHOTOMOD Control Panel**. Besides, it can be started using context menu which is opened on right-clicking an icon or pressing a button in Project Management window of **PHOTOMOD Core**. The program window looks as shown below:



Control Panel window

The window displays resources system, which may be available for working in **PHOTOMOD** system. Each profile has its own resources structure that is a list of virtual folders, which are matched to regular folders on drives, on different computers in network for **PHOTOMOD** system file resources storage. In one work session in **PHOTOMOD** system only one selected profile is available (*active profile*) for work.

The window is divided into two parts: the **Profiles** and **Resources tree**.

The left side, **Profiles**, displays list of profiles, indicating the total free space to store all resources of this profile. Total free space is amount of free space on all drives, which contain connected folders. Profiles can be local and network and they are marked in list with different icons. For more information about network profiles, see chapter Creating and connecting network profiles.
The right side, **Resources tree**, displays list of virtual folders and corresponding regular folders or groups of storages on network drives for selected profile, as well as information on free space on those disks.

Toolbar buttons are designed to perform following operations:

• - **Initial setup**. It allows setting initial configuration. Opens PHOTOMOD initial setup window to organize data access and work with network profiles; their configurations are stored in central repository. See chapters Network processing and Creating and connecting network profiles.

• - **Create profile**. It allows creating new *local* profile. Opens **New profile** window, where user must enter name of new profile, and then opens **Connect virtual folder** window, which proposes to create the virtual folder, that means to specify its name and associate the virtual folder with a folder on the hard disk or group of storage folders. It is necessary to connect at least one virtual folder for projects to use profile in PHOTOMOD. The profile created is displayed in **Profile** list. Creating new network profile is possible only in **Network profiles management** window, provided that central control folder of network profiles (centralized repository) is connected using **PHOTOMOD initial setup** window. See chapter Creating and connecting network profiles.

• - **Delete selected profile**. It allows deleting the local profile, which is selected in the list, and its resources *structure*. However, all resources are not removed physically, and may be used to connect later (using virtual folders) to new or existing profiles. The button is not available for network profile. To delete network profile, push the **Manage network profiles** button. See chapter Creating and connecting network profiles.

• - **Create copy of selected profile**. It allows user to copy selected profile along with its resources structure and save it under new name. It opens **Copy Profile** window, which offers to specify new profile name. When you copy network profile, it creates local profile, which inherits network profile resources structure.

• - **Rename selected profile**. It allows user to rename selected in list *local* profile. It opens **Rename profile** window, which offers to specify new profile name. The button is not available for network profile. To rename network profile, push the **Manage network profiles** button. See chapter Creating and connecting network profiles.

• - **Activate selected profile**. It allows user to select active profile; its resources space will be available for work in the next **PHOTOMOD** session. The active profile is marked with "red tick". It is strongly recommended to close all currently running **PHOTOMOD** modules and push the **Apply** button.

• - **Connect folder**. It allows user to connect new virtual folder to selected local profile. It opens **Connect virtual folder** window, which allows specifying name of new virtual folder and absolute path to local / network folder or group of storages to store virtual folder data. See chapter Virtual folders connecting. New connected virtual folder and its pass are displayed in **Resources tree** list. It possible to add new virtual folders in **PHOTOMOD Explorer** window too; it displays all resources, including all subfolders and files related to virtual folders. However, it's possible to disable and rename virtual folder in **Control Panel** only. The button is not available for network profile. Push the **Manage network profiles** button to connect virtual folder to network profile. See chapter Creating and connecting network profiles.

• - **Disconnect folder**. It allows user to disconnect selected in Resources tree list virtual folder of local profile. In this case, folder on disk, which is matched to this virtual folder, is not deleted, only virtual name and path are "forgotten". The button is not available for network profile. Push the **Manage network profiles** button to disconnect virtual folder to network profile. See chapter Creating and connecting network profiles.

• - **Modify folder**. It opens **Virtual folder properties** window for editing selected virtual folder of local profile.

• - **Refresh storage directories**. It allows user to update storage indices in case of incorrect work. See also chapter Storages.

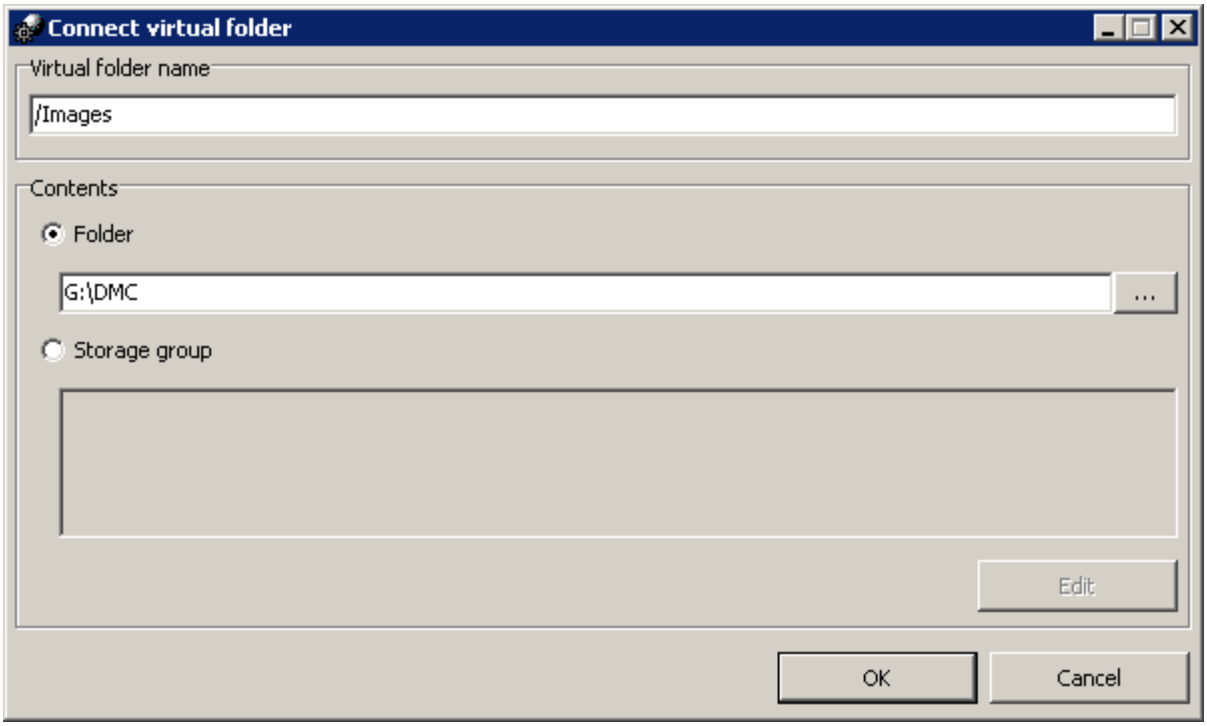
At the top of **Control Panel** is the menu of program, containing the following items:

- **Profile** – allows user to define profiles for work in PHOTOMOD system
  - **Create profile** – duplicated by the button;
  - **Delete selected profile** – duplicated by the button;
  - **Create copy of selected profile** – duplicated by the button;
  - **Rename selected profile** – duplicated by the button;
  - **Activate selected profile** – duplicated by the button;
- **Resources** – allows user to define resources structure for profiles
  - **Connect folder** – duplicated by the button;
  - **Disconnect folder** – duplicated by the button;
  - **Modify folder** – duplicated by the button;
- **Service** – allows user to specify folder for settings storing and central control folder of profiles
  - **Initial setup** – duplicated by the button (see chapter Creating and connecting network profiles).
- **Help** – allows user to view help file and get information about program
  - **Help index**
  - **About**

10.2 Virtual folders connecting

Click the icon in Control Panel window, or select menu **Resources | Connect folder** to connect to new virtual folder. Then **Connect virtual folder** window opens.

In the top field enter name of virtual folder. **Contents** allows user to define local or network regular folder or group of regular folders to connect as virtual folder. Enable **Folder** option, push the button and select regular folder to connect local or network regular folder.



Connect virtual folder window

Enable **Storage group** option and push the **Edit** button to connect group of storages. Then **Edit list of storages** window opens, which contains the following toolbar buttons:

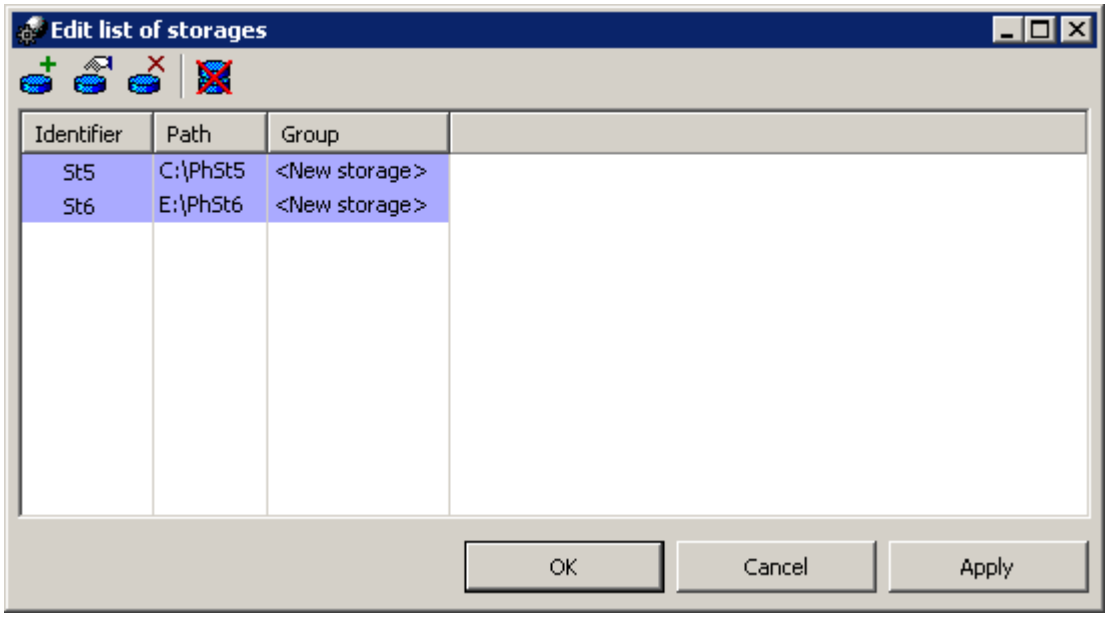
– **Create/connect storage**. It allows user to create new storage or connect existing. It opens **Browse folders** window to select regular storage folder. If new storage is connected, then **Storage identifier** dialog window opens, where it is necessary to input a unique storage name, which can consist of digits and latin letters. The **$PhStorage.x-ini** file is created in the selected folder as well as storage identifier and list all identifiers of created group of storages. If existing storage is connected, then identifier already assigned to storage is read automatically. See chapter Storages.

– **Storage properties**. It opens **Storage identifier** window to edit the identifier.

– **Remove storage from the list**. It allows user to disconnect the storage selected in the list. Identifier is read automatically when the storage is connected next time.

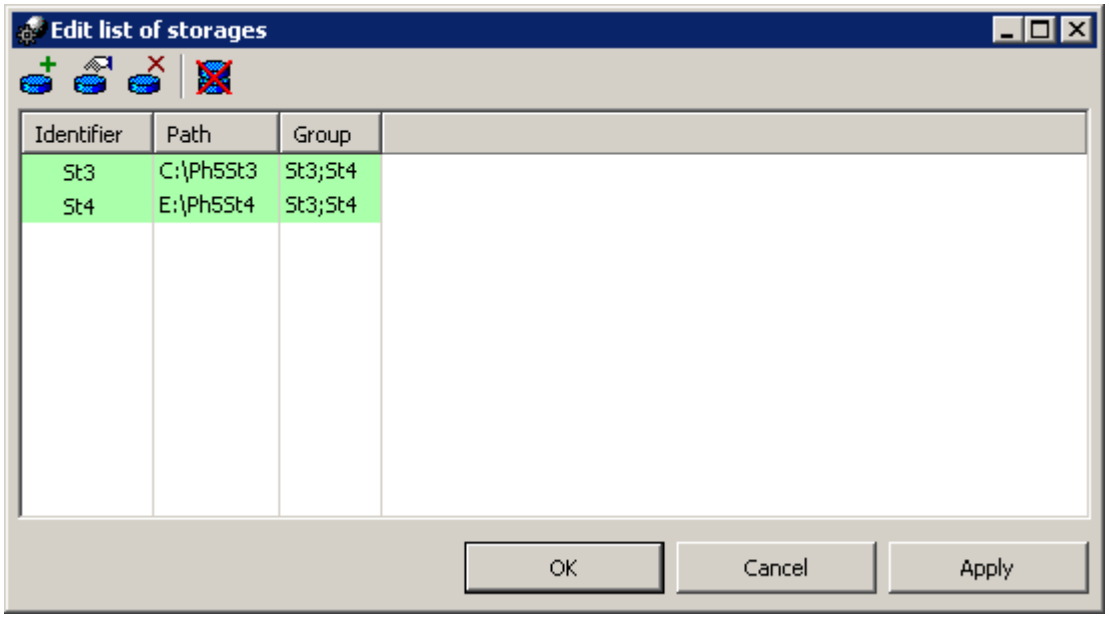
– **Clear list of storages**. It allows user to disconnect all storages of the group. Identifiers are read automatically when the storages are connected next time.

Note: Attention. Editing of storage identifiers and structure storages of group may lead to errors in system functioning.



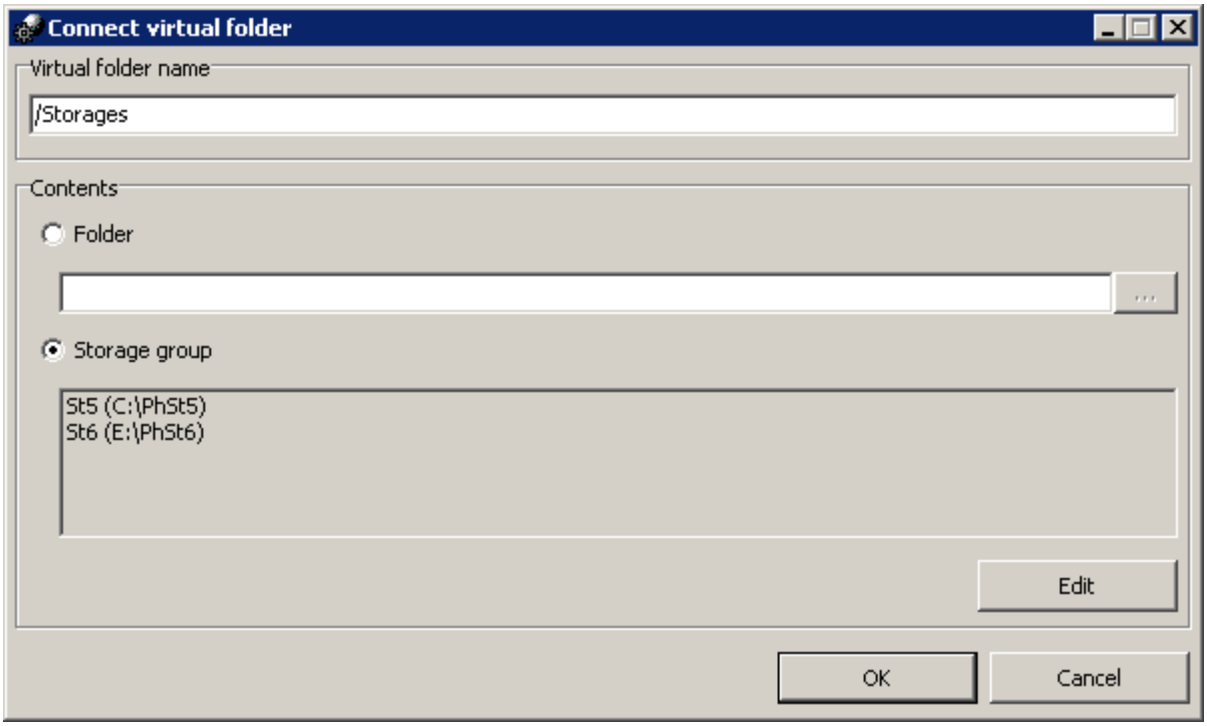
Connecting new storages in **Edit list of storages** window

Create new storage or connect existing, then push the **Apply** button. The list of all storages identifiers in the group are displayed in the **Group** field of each storage.



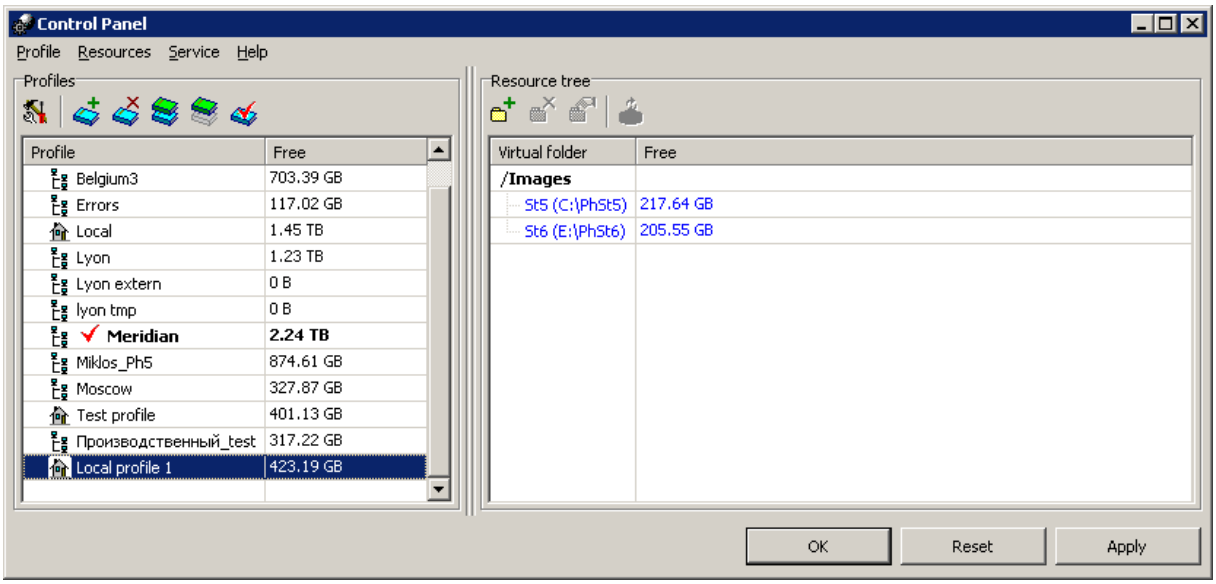
The window displays created group of storages

Press the **OK** button. List of storages will be displayed in **Connect virtual folder** window.



The list of storages group

Press the **OK** button. Virtual folder for storages group will be displayed in the Resource tree list in Control Panel. See also chapters Storages and Distribution of resources on servers.

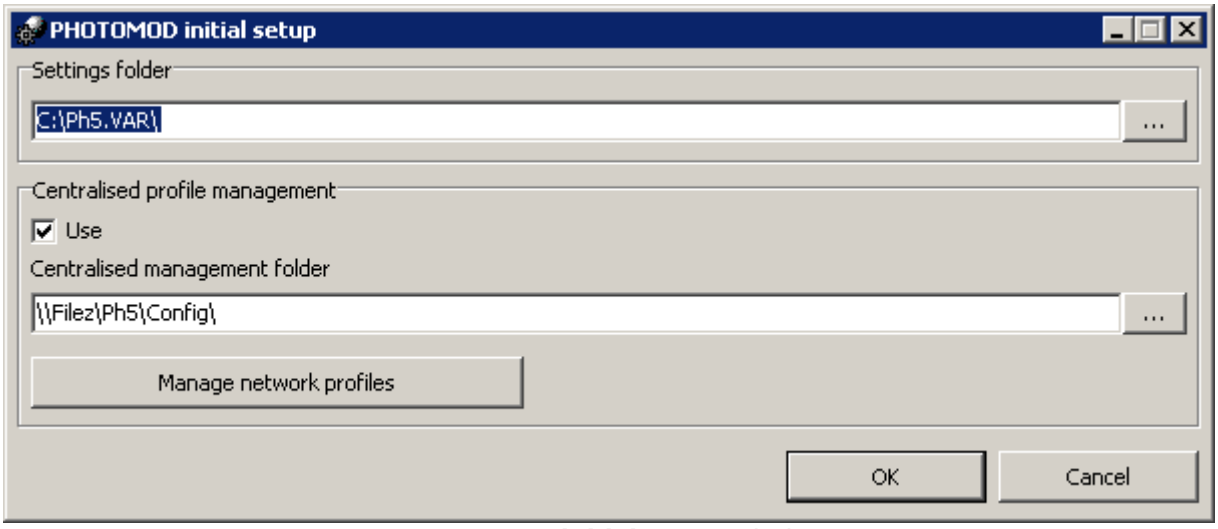


Resource tree using storages group

10.3 Creating and connecting network profiles

PHOTOMOD initial setup window, the main setting in which is the central control folder for storing configuration files of network profiles, is used to create / edit network profiles, as well as providing access to network profiles. Using network profiles is provided for implementation of network processing of one project. See chapter Network processing.

PHOTOMOD initial setup window is started from **Control Panel** by pressing the button.



PHOTOMOD initial setup window

Top field is used to define settings folder. By default, this is *PHOTOMOD5.VAR* folder, which is specified during PHOTOMOD system installation. The *PHOTOMOD5.VAR* folder is used to store all configuration and temporary files; it is the same for all installed PHOTOMOD modules on workstation, regardless of number of PHOTOMOD copies, installed in different folders. See chapter PHOTOMOD5.VAR configurations folder.

Centralised profile management window is used to create new settings folder for network profiles with following definition of resources trees of network profiles, as well as to connect to existing configuration repository to provide access to network profiles on workstations.
It is necessary to gain an access to network profiles in just created central control folder and have opportunity to work with them, specify configuration folder of network profiles in **Centralised management folder** field and enable **Use** option. The **Manage network profiles** button becomes available, which can edit profiles or create new ones.

But it's the administrated, who is supposed to specify the central control folder and to create network profiles, and in this case the user's intervention into network profiles structure may cause serious problems. Press the **OK** button after specifying the centralised management folder. The profiles list in the **Control Panel** window will display all the network profiles which are configured by the centralised repository specified. Activate network profile, press **Apply**, restart all currently running PHOTOMOD modules and start your work.

On connecting the workstation to the central repository, all the network profiles configurations stored in it are automatically copied to the local **PHOTOMOD5.VAR** folder. This way the network profiles become accessible even when central repository is not available. But the feature should be used very carefully to avoid corruption of data integrity working through the network later. See chapter PHOTOMOD5.VAR configurations folder for more details.

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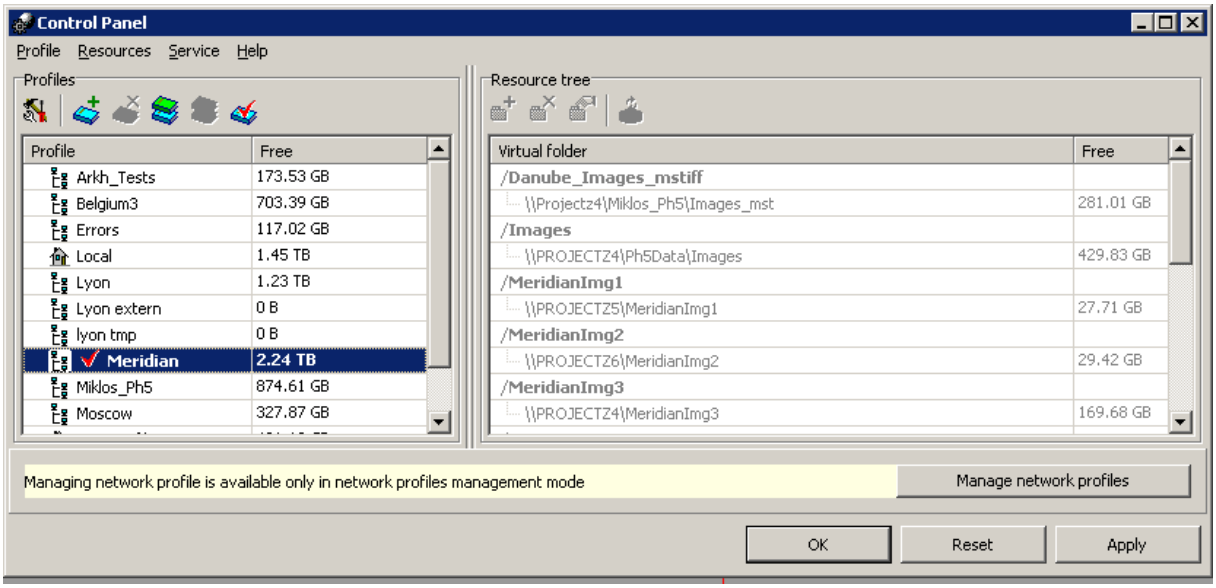
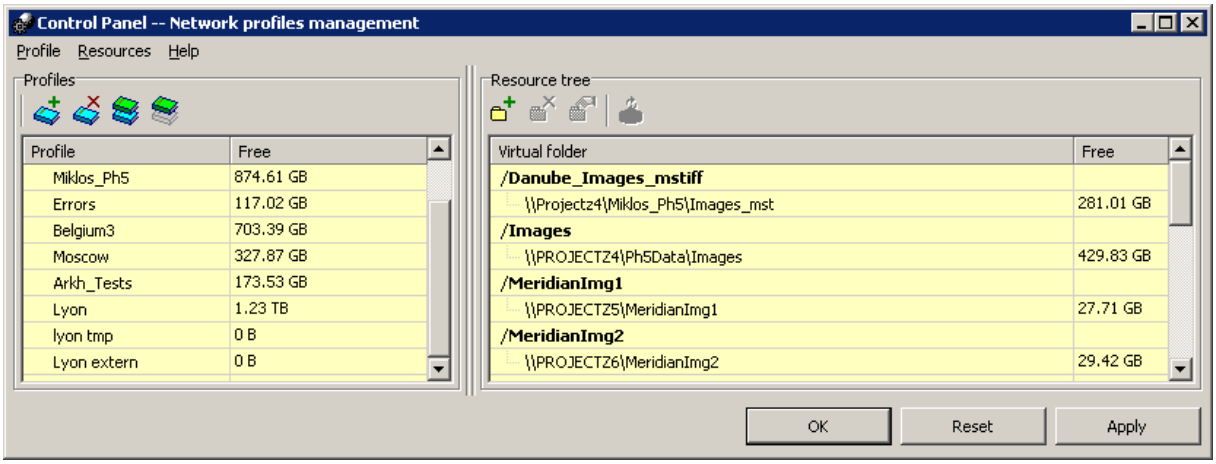


Network profile in **Control panel** window

It is necessary to create new central repository with network profiles, specify new local or network regular folder for storing configuration of network profiles in **Centralised management folder** field and enable **Use** option. The **Manage network profiles** button becomes available. Press this button to create and edit network profiles. **Control Panel - Manage network profiles** window are displayed.



Control Panel - Manage network profiles window

Create network profiles and define resource tree for them. Press the **Apply** button. In **Profiles** folder of specified central control folder following is created:

- The **profiles.x-ini** file, which contains list of all network profiles;
- Names of subfolders of profiles, which match to names of profiles, which contains **profile.x-ini** configuration files of profile resource. Each profile.x-ini file, which matches to specific profile, contains the definition of profile resources tree; this is list of virtual folders and specified absolute paths for them to regular folders or storages.

Press the **OK** button. Created network profiles will be displayed in **Profile** list in Control Panel and will be available to work in **PHOTOMOD** system. At the same time backup copies of network profiles configuration folders are created in local PHOTOMOD5.VAR folder. Therefore, network profiles becomes available to work (but not for editing), even when centralized repository is unavailable. See chapter PHOTOMOD5.VAR configurations folder.
Network profile edition is possible in control mode of network profiles only using the **Manage network profiles** button.

Creation / edition of network profiles in **Control Panel - Manage network profiles** window is performed in the same way as local profiles in Control Panel window. Structure of local and a network profile is the same. See chapters Control Panel and Virtual folders connecting.

Menu of **Control Panel - Manage network profiles** window contains the following items:

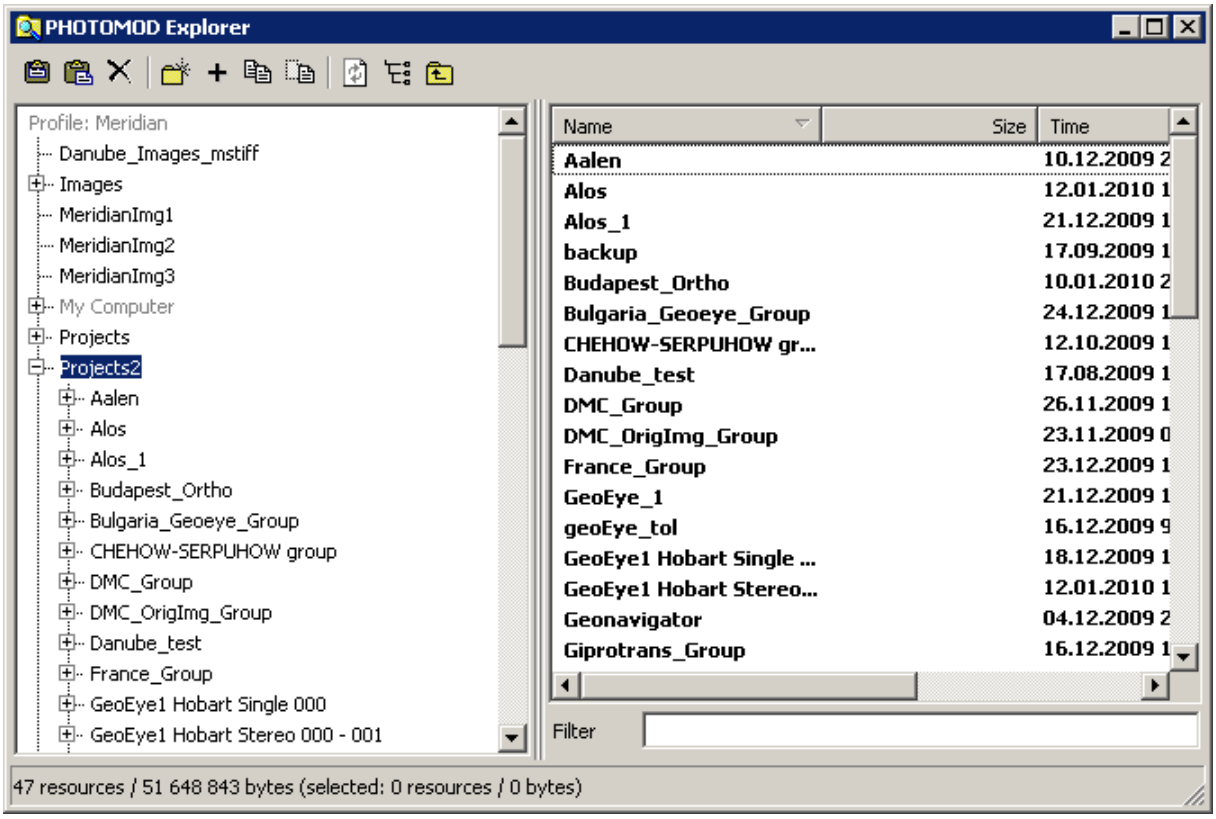
- **Profile** – allows user to define profiles for work in PHOTOMOD system
  - **Create profile** – duplicated by the button - allows user to create new network profile.
  - **Delete selected profile** – duplicated by the button - allows user to delete selected network profile.
  - **Create copy of selected profile** – duplicated by the button - allows user to copy selected network profile under new name.
  - **Rename selected profile** – duplicated by the button - allows user to rename selected network profile.
- **Resources** – allows user to define resources structure for network profiles
  - **Connect folder** – duplicated by the button – allows user to connect new virtual folder to selected network profile. See chapter Virtual folders connecting.
  - **Disconnect folder** – duplicated by the button – allows user to disconnect selected virtual folder.
  - **Modify folder** – duplicated by the button – allows user to edit captures of selected virtual folder; to edit name of virtual folder and redefine content (another drives folder or group of storages).
- **Help** – allows user to view help file and get information about program
  - **Help index**
  - **About**

10.4 PHOTOMOD Explorer

PHOTOMOD Explorer is separate program to work with **PHOTOMOD** system resources. The following possibilities of start **PHOTOMOD Explorer**:

- Using the **Start** menu OS Windows: **Programs | PHOTOMOD | PHOTOMOD Explorer**;
- Using the right-click menu, which displayed by click on **System Monitor** icon in Windows OS system tray;
- Using some dialog windows during the work in **PHOTOMOD Core** using the button;
- Using **PHOTOMOD Core** menu **Service | Explorer**;

This window displays all resources of active profile.



PHOTOMOD Explorer window

System resources include projects, cameras data, images and other. Projects, in turn, include of resources like TIN, 3D vectors, etc. List of resources is presented in hierarchical form. See also chapter PHOTOMOD resources system.

Toolbar PHOTOMOD Explorer is used for following operations:

- - **Copy to clipboard**. Allows user to copy resources to clipboard;
- - **Paste from clipboard**. Allows user to insert resources from clipboard;
- - **Delete**. Allows user to remove resources;
- - **New folder**. Allows user to create and add new regular folder to resources system of active profile. It should be remembered that upper branches of resources tree are virtual folders, and it is impossible to create new regular folder at this hierarchical level.
- - **Connect folder**. Allows connecting new virtual folder. **Connect virtual folder** window opens, where it necessary to specify virtual folder name and match to him regular folder on drive (blank or with data). Is always created virtual folder at the top hierarchical level and all data (folders and files), belonging to regular folder, become resources.
- - **Create copy**. Allows user to copy resource under new name in same folder.
- - **Rename**. Allows user to rename resource.
- - **Refresh**. Allows user to update resources which are modified using **PHOTOMOD Explorer**.

- - **Show resources in subfolders**. Allows user to view all resources in all subfolders of selected folder, or entire profile. The list on the right side of the window shows all subfolders, and all files of selected folder and path to them.
- - **One folder up**. Allows user to move one level up in resources tree.

In addition there is the ability to search needed files in resource system of profile. Use bottom **Filter** field to do this.

Note 1: The tools should be used carefully to edit resource structure in PHOTOMOD Explorer window in order to avoid loss of needed resources, belonging to project (delete, rename or move configuration files of projects, etc.).

Note 2: In PHOTOMOD Explorer window, it's possible to connect new virtual folder only to local profile. Use Control Panel for network profile. See also chapters Control Panel and Creating and connecting network profiles.

Note 3: All changes, associated with connecting new virtual folders in PHOTOMOD Explorer, are displayed in Control Panel automatically. It is impossible to disable or edit virtual folder in PHOTOMOD Explorer. Disconnect or rename virtual folder is possible in Control Panel only. See chapter Control Panel.

Note 4: It is impossible to connect storage as virtual folder in PHOTOMOD Explorer. This is possible in Control Panel only. See chapter Control Panel.

The context menu, which opens by pressing right button in right window, contains following commands:

- **Open in default program** - open resource with associated Windows program or choose a program to open with, if no default program associated
- **View as text** - view resource in text editor;
- **View as binary** - view resource in binary viewer;
- **View as image** - view resource as an image;
- **Open in external editor** - open resource with program specified via command "Set external editor";
- **Edit metadata** - open resource metadata with program specified via command "Set external editor";
- **Set external editor** - choose an external program to be used by default. Filename in the command line is specified as %1 and in majority of cases should be enclosed in quotes. For example, to use FAR as an editor, the command line should be **/E "%1"**. However, if a program requires only the filename as parameter, the field may be left empty;
- **Copy** - create a copy of the resource with a new name in the same folder (duplicated by the button);
- **Rename** - rename the resource (duplicated by the button);
- **Delete** - delete the resource;
- **New folder** - create *new subfolder* in the current folder;
- **Copy to clipboard** - copy resource identifier to clipboard so that it can be copied to another folder with the command Paste from clipboard (duplicated by the button);

- **Paste from clipboard** - create a copy of a resource (whose identifier has been saved to clipboard with the Copy to clipboard command above) in the current folder (duplicated by the button);
- **Refresh** - refresh windows contents (duplicated by the button);
- **Select all** - select all resources in the current folder;
- **Show size in compact format** - show resource sizes in human-readable form (e.g. "1 MB") instead of strict number of bytes (e.g. "1048576 b");

11. Preparing images for processing in PHOTOMOD system

For working with images in PHOTOMOD system, it is recommended to use PHOTOMOD MS-TIFF internal raster format, which is the TIFF format with overview pyramid (set of subsampled images copies) for higher image display performance. However, it is possible as well to work with various formats of rasters "directly" (without conversion) in PHOTOMOD system. On the one hand, it allows user to save disk space, on the other hand, it can significantly slow down images processing, and thus it is better to use rasters in MS-TIFF-format.

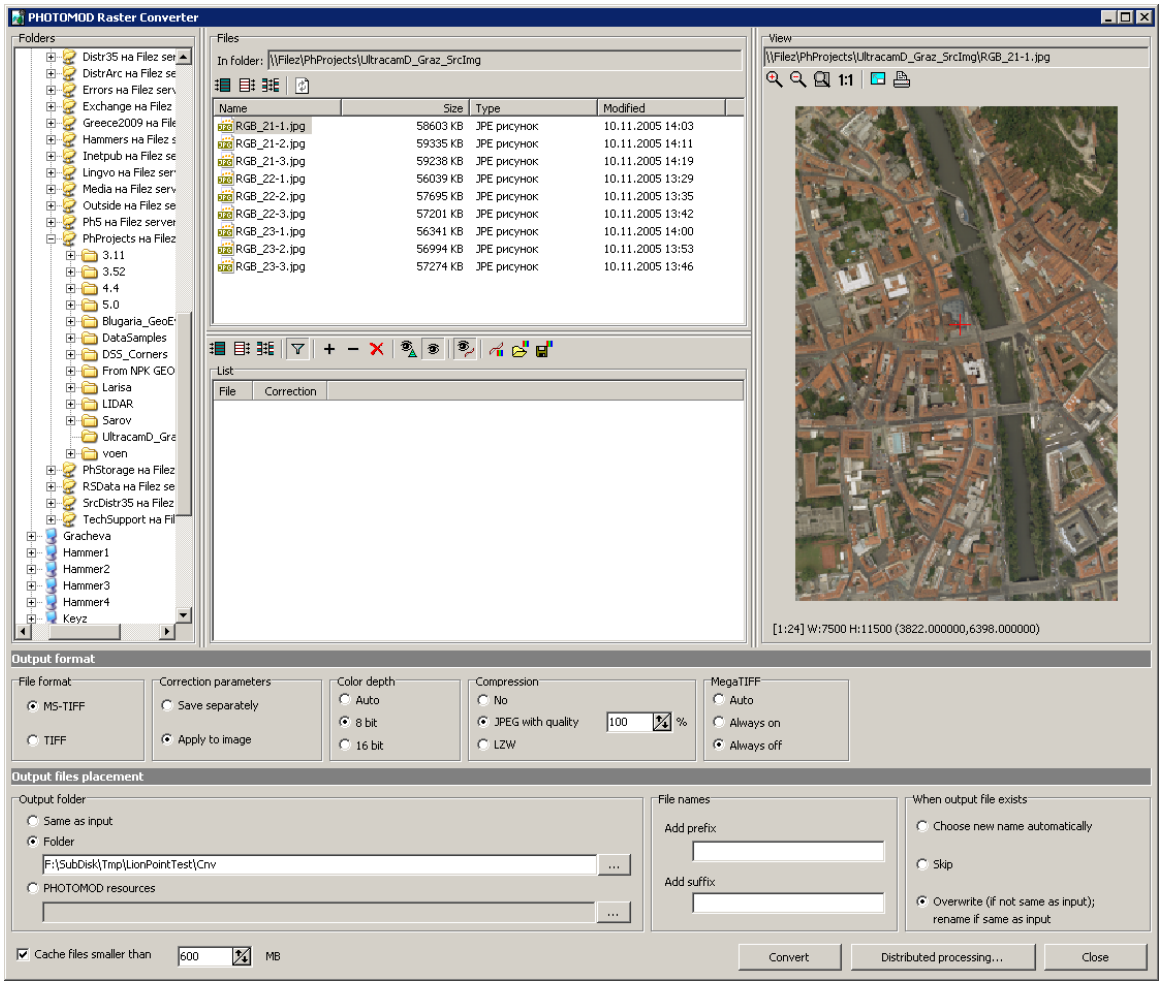
It is possible to convert image into internal format on the stage of adding images into project in PHOTOMOD system, but when it is planned to work with large quantities of images on different drives which occupy large disc space in its original format, it is recommended to prepare images using PHOTOMOD Raster Converter before creating new project.

See chapter PHOTOMOD Raster Converter.

11.1 PHOTOMOD Raster Converter

PHOTOMOD Raster Converter is an utility program for batch conversion of raster files into **PHOTOMOD MS-TIFF** internal format with **JPEG** or **LZW** compression to reduce raster file size, as well as conversion of **MS-TIFF** files into standard **TIFF** format to use images from **PHOTOMOD** project in other systems incompatible with **PHOTOMOD MS-TIFF** format.

To run **PHOTOMOD Raster Converter** program, click **Start | Programs | PHOTOMOD | PHOTOMOD Raster Converter**. In addition **PHOTOMOD Raster Converter** can be called from **PHOTOMOD Core** menu by selecting **Tools | Raster Converter**.
The program main window is shown below:



PHOTOMOD Raster Converter window

Program **PHOTOMOD Raster Converter** has the following functions:

- Convert images in different raster formats to files in **PHOTOMOD MS-TIFF** internal format;
- Convert rasters in **PHOTOMOD MS-TIFF** format and other formats into standard **TIFF** files;
- Convert 8-16 bit images;
- Convert to uncompressed or JPEG compressed images of varying quality, as well as **LZW** without loss of quality;
- Convert rasters larger than 4 GB to **MegaTIFF** format;
- Apply radiometric correction to improve visual properties of images;
- Convert to specified local or network folder (in order to connect it into profile resources to add rasters from resources) or to place converted files directly into resources of active profile;
- Use distributed processing.

Selecting and viewing source images

Source images may have following raster formats:

- **Tag Image File Format (TIFF)** – TIFF, including the 12-bit rasters from DMC camera, and GeoTiff format (which contains special section ("tags") for georeferencing data record)
- **Windows Bitmap File (BMP)** - also supported input 4-bit palette image
- **VectOr Raster Maps (RSW)** - PHOTOMOD VectOr system
- raster formats
- **ERDAS IMAGINE (IMG)** - ERDAS raster format
- **NITF (NITF)**

- **JPEG (JPEG)**
- **GIF (GIF)**
- **PNG (PNG)**
- **JPEG2000 (JP2)**
- **PCIDSK (PIX)** - raster format with georeferenced in title, developed by PCI Geomatics

In **Folders** and **Files** sections select image files and, using button , add them to files list to convert. In this way a list can be formed from the set of files located in different local or network folders, as well as on different drives, converting them to selected folder.
In order to display source images (with higher image display performance) in preview window in the **Preview** pane or in **Radiometric correction** window (see chapter Radiometric correction of images) it is necessary to create a temporary pyramid. Temporary pyramid is created automatically when user selects file without pyramid using with “View all the images" button pressed. The **Pyramid** subfolder with overview files is created in the folder of source file. Temporary pyramid is also created automatically when button is pressed to display the image in **Radiometric correction** window.

The following tools are available to select the source files in **Files** section:

- select all files in the given folder;
- cancel selection for all files;
- invert selection;

Refresh button allows updating the lists of folders, files, in case of edits in structure files during launch **PHOTOMOD Raster Converter**.
Toolbar of **List** section contains the following buttons:
- Select all images in the list;
- Unselect all selected images;
- Invert selection;
- Filter files by file extension to display only images of supported raster formats (the default filter state is "on");
- Add files to the list;
 - Exclude files from the list;
- Remove all files from the list;
- View rasters with overview pyramid present only - allows to show in preview window rasters with created pyramid (by default this button is pressed);
- View all rasters (when selecting a raster file without pyramid, the temporary pyramid is created automatically, then image is displayed in preview window);
- View images using radiometric correction parameters (by default the button is pressed);
- Open the **Radiometric correction** window (see also chapter Radiometric correction of images);
- Load correction parameters for selected images (using correction parameters, which have been saved in rmc file, for the selected images);

- Save correction parameters of selected image (saving settings to rmc file).

View section contains Viewing images window, as well as a toolbar, which contains the following buttons:

- Zoom window in;

- Zoom window out;

- Zoom window to fit;

- Zoom window to 1:1 scale (image pixel matches to screen pixel);

- Display image in full screen;

- Open print image dialog. See chapter Printing images.

To show/hide scrollbars in the window, **Ctrl+F8** shortcut is used.

Radiometric correction of images

If not satisfied with the visual properties of images, you may apply radiometric correction to them. Radiometric correction is mainly used at image preparation stage for correcting radiometric distortions caused by sensor specific characteristics. See chapter Radiometric correction of images.

Output parameters and selection of target folder

The following output parameters are set in **Output format** panel. In **File format** section select the output format - **MS-TIFF** (by default) or **TIFF**. Decide if you are going to apply parameters of radiometric correction directly to raster or save them separately in **rmc**-file (by default). Select 8 or 16 bits per sample color depth (default is **Auto**). If it is necessary apply compression - **JPEG** with certain quality or **LZW** without quality loss. Enable the appropriate option in **MegaTiff** section, if converted rasters are larger than 4 GB (default is **Auto**).

Correction parameters section contains the following settings:

- **Save separately** - correction parameters are stored separately in rmc file extension; only geometric transformations (rotations, reflections) are applied to images. In PHOTOMOD system the file is displayed with the specified correction parameters.
- **Apply to image** - all changes are applied directly to the raster, i.e. the raster is saved with changes.

Depending on the source image, in **Precision** section select: **Auto** (by default), **8** bits or **16** bits. **Auto** results in 8 bps, if the input image has 8 or fewer bits and **16** bps otherwise.

In the **Compression** section select the type of compression (by default is **No** - no compression). Image compression may be performed using **LZW** algorithm (the image is compressed without loss of quality) or **JPEG**. Compression level can be set in the appropriate input field for usage of **JPEG** algorithm. Default compression quality value is 80%, which will decrease the size of images by 5-7 times. In most cases, this does not lead to significant loss of quality, but allows saving disk space.
Compression is available for the **MS-TIFF** output format only.

MegaTiff format is provided to convert large images. **MegaTIFF** is a set of **MS-TIFF** raster files in the folder with the file name which is created in the output folder during the converting and the file *.prf extension.

MegaTiff section contains the following options:

Auto (default) - **MegaTiff** is only created if the raster input size is greater than 2 GB, in other cases - MS-TIFF;
Always On - **MegaTiff** is created for any rasters disregarding their sizes.
Always Off - **MegaTiff** is never created, use this option with caution, because this means that rasters greater than 4 GB would not be displayed correctly in **PHOTOMOD** system.

In **Output files placement** panel define the target folder for the placement of the converted file images, the rules of creation output file name, as well as actions in the situation, if output file exists in the target folder.

The following options can be used for placement of output files:

- Source folders, i.e. folders with source files;
- Any regular folder of file system. To select a folder press the button ... . The **Browse folder** window opens. Select an existing local or network folder or create a new one.
- Resource folder of the current profile. To select a folder press the button ... . **Folder selection** window opens. Select an existing folder or create a new one. See also chapter PHOTOMOD resources system.

If necessary, output file names may be changed by appending a prefix or suffix to the filename. Also, rule should be chosen for dealing with output file if target file or resource already exists in the target folder. The following actions are possible:

- **Select a new name automatically** - the new name is generated automatically using template "Name[i]. Ext", where "Name.Ext" is initial target file/resource name and i>0 - a number;
- **Skip** - skip (do not convert) the image;
- **Overwrite** (if not same as input), rename, if same as input - overwrite if the file in the target folder is not the input file of the conversion process, or generate a new name automatically otherwise.

After all settings made, press the **Convert** button or use **Distributed processing**.

11.2 Radiometric correction of images

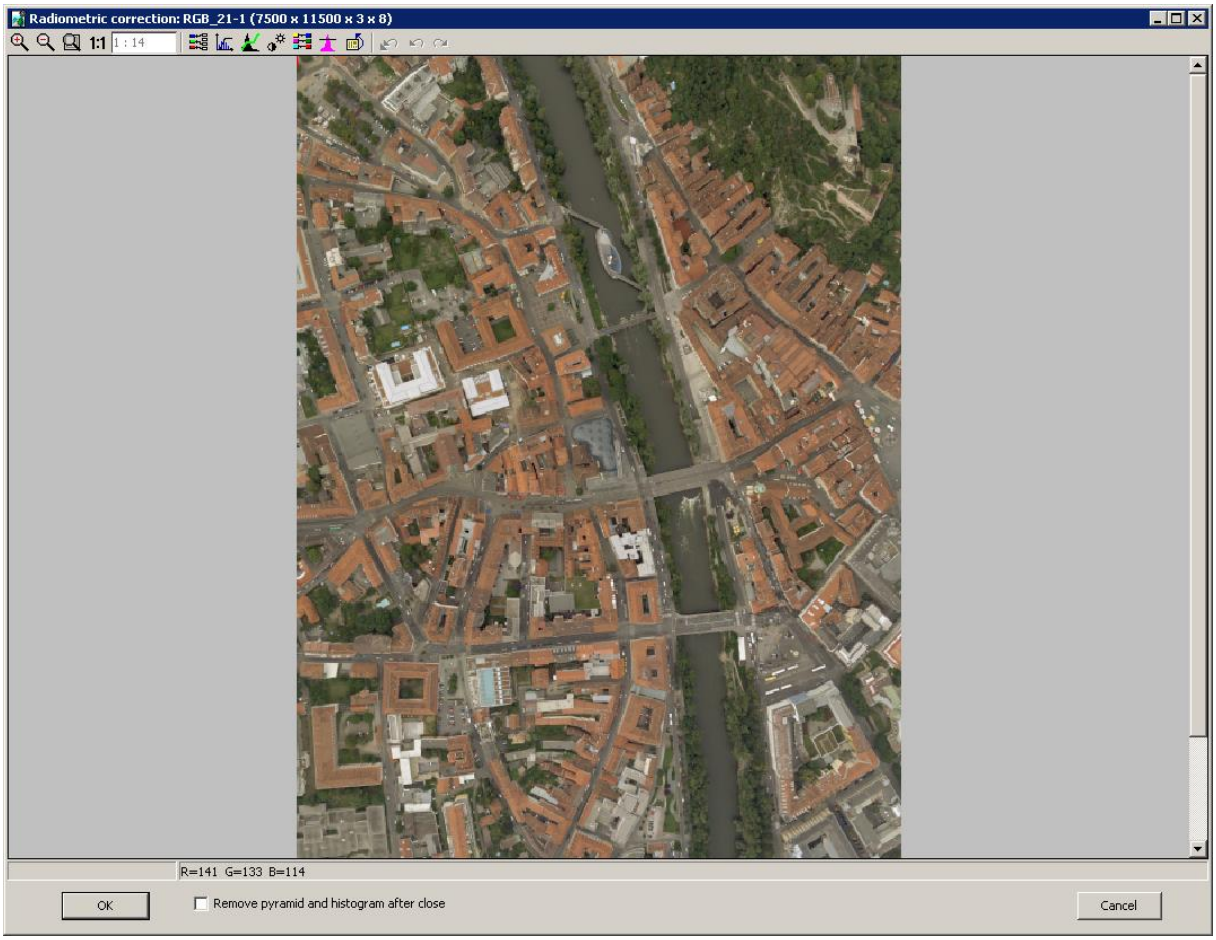
Sometimes images which are added to PHOTOMOD projects, do not possess the characteristics sufficient for comfortable viewing and analysis. This may be due to the peculiar properties of the optical path of surveying devices, radiant energy converter, analog-digital converter, etc. Such images require radiometric preprocessing dealing with improvement of their visual characteristics. The common case is with 16-bit images which in their raw form look plain black, in this case auto-levels correction is minimum requirement.

Radiometric processing of images may be performed either on preparatory image conversion stage in **PHOTOMOD Raster Converter** or directly within PHOTOMOD Core when adding images into the project in **Add images** window; it contains nearly all the functions of Raster Converter (see the documentation to **PHOTOMOD Core**). To open **Radiometric correction** window, select the file in the list of files to convert and press the button or double-click on the file name in the list. For higher image display performance in the preview window a temporary pyramid is created (if it had not been created before).

Note: temporary pyramid image is created in a Pyramid subfolder of folder with the source images. Therefore, user should have sufficient free space on selected drive,

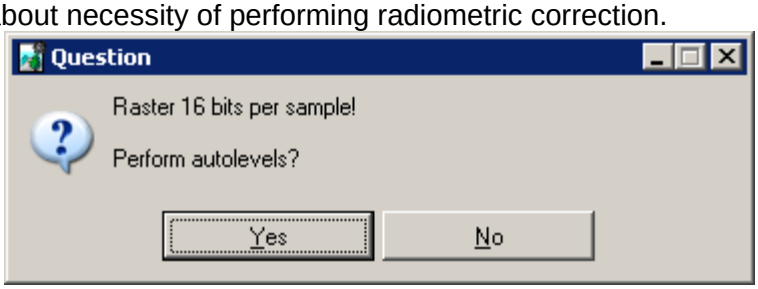
otherwise the pyramid will not be created and visualization of images having no intrinsic overview pyramid will be slow.

Temporary pyramidal image and image histogram, which are used for image processing, can be deleted after closing **Radiometric correction** window, if the check box **Remove the pyramid and the histogram on exit** is checked. **Radiometric correction** window will open after creating the temporary pyramid.



Radiometric correction window

In some cases depending on the image type, when the window is opened the system can issue a warning about necessity of performing radiometric correction.



Title bar of **Radiometric correction** window displays the name of image, as well as its width, height and number of bits per pixel.
Main toolbar contains zoom control buttons:

- Center on marker and zoom in;

- Center on marker and zoom out;

- Zoom image to fit in window;

- Center on marker and zoom image to 1:1 scale (image pixel matches to screen pixel).

The next group of buttons provides tools for radiometric correction of images:

- Edit list of channels;

- Perform auto-levels;

- Perform correction with "curves" tool;

- Edit brightness, contrast, gamma;

- Edit color balance;

- Apply a selection of filters.

There is also a tool for geometric transformations:

- Use geometric transformations (rotate, mirror).

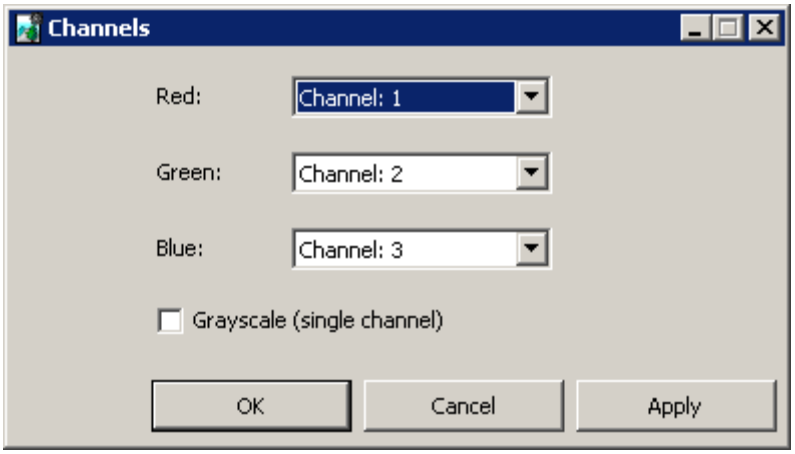
Toolbuttons group for undo/redo operations (depth of Undo/redo is 10 steps):

- Undo all actions;

- Undo most recent action

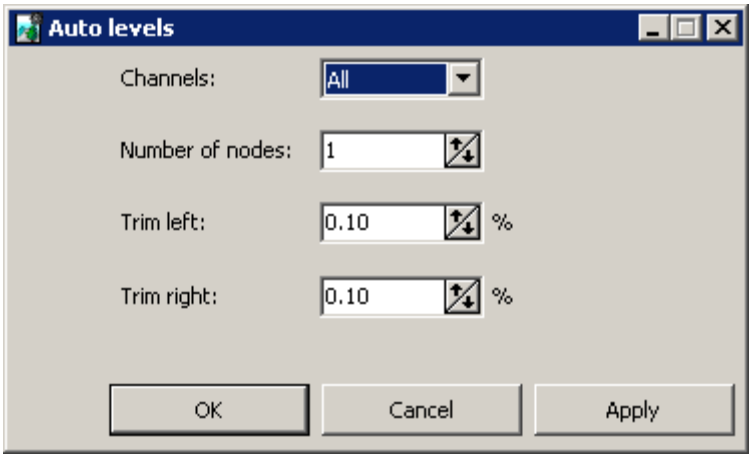
- Redo most recently undone action.

If the number of bits per channel is larger than 8, then the operation of stretching histogram is applied to the entire brightness range independently for each channel. Also this operation can be applied manually for each channel in the **Channels** window opened with the (**Channels**) toolbutton. The initial order of channels is set depending on the image.



Channels window

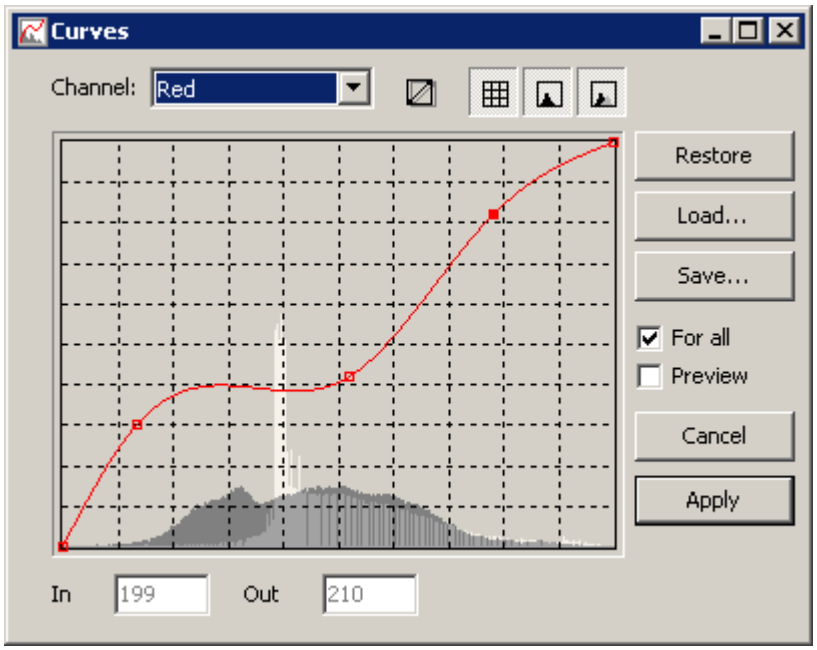
The button opens the **Auto levels** window.



Auto levels window

This operation consists in stretching histogram of the source image for the entire brightness range. Select desired image channel in the **Channels** dropdown list (blue, green or red) or all at once, to apply the rest of stretching histogram parameters to them. **Number of nodes** parameter specifies the number of segments of the transfer function and should be left "1" for majority of cases. The **Trim left** and **Trim right** set the percentage of corresponding (left or right) histogram edges which will not be considered during the operation.

To view the image histogram and set the transfer function, specifying an arbitrary brightness transformation, used the window which opened by pressing the button (curves).



Curves window

Graphically, this function is viewed as a curve, color of which is determined by the selected channel. Values of image brightness are plotted on X-axis before the conversion (the value in the **Input** field), and on the Y-axis - after convertion (value in the **Output** field). The transfer function is defined by setting the nodal points (the small squares). Between the nodal points the transfer characteristic is a cubic spline.

To add a node point it is necessary to put the marker to the desired point of the histogram, and click the left mouse button. To delete a node point, right-click on the selected point. To select the nodal point click the left mouse button close to it. To move the selected nodal point move the marker, holding down the **Ctrl** or **Alt** key.

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The transfer characteristic can be specified for each channel separately in the case of color images, as well as for all channels at once (set the check box **For all**). Select active color channel (**Red**, **Green**, **Blue**) is in **Channel** drop-down list.

For all the changes the transfer characteristic is immediately displayed in the image preview window if **Preview** checkbox is checked.

In addition, there are the following buttons:

- Restore linear dependence;

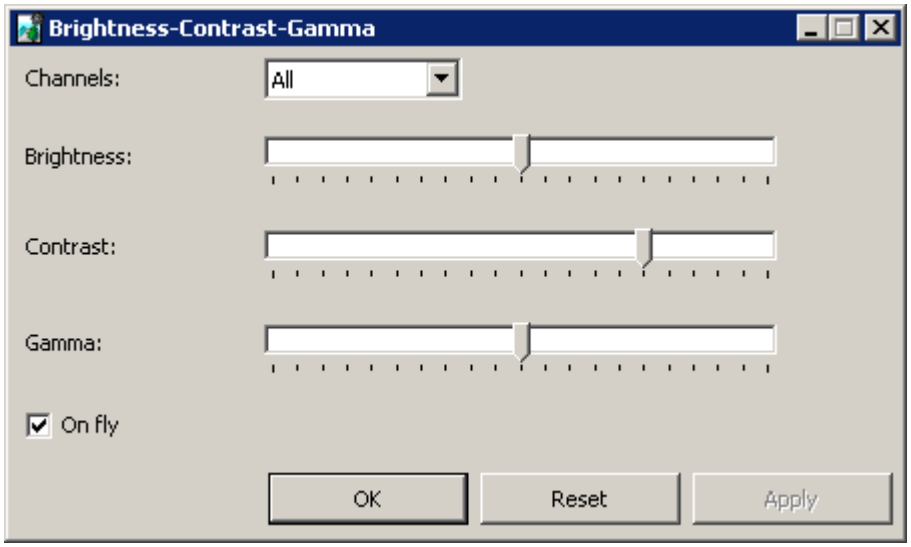
- Show grid;

- Show source histogram (shown in gray);

- Show destination histogram (shown in white).

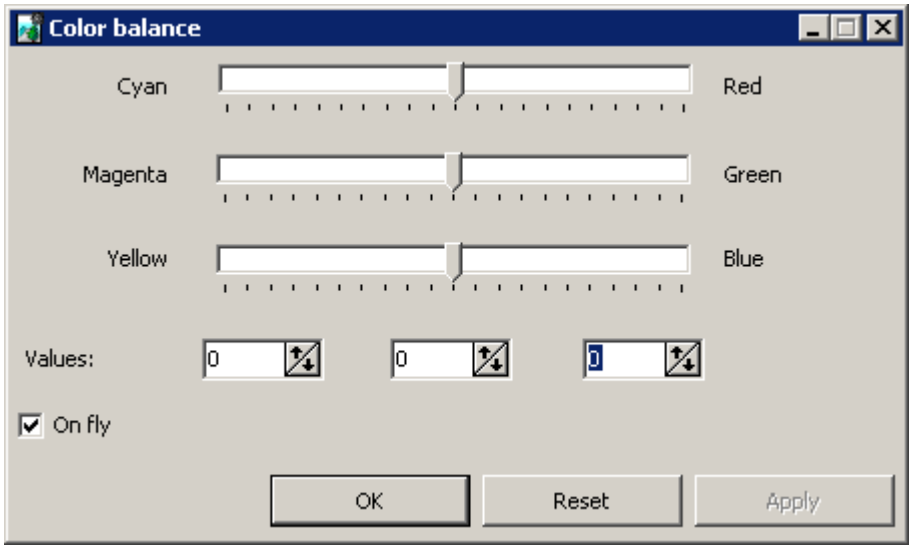
To completely restore all curves (undo all changes) use the **Restore** button.
Curves can be saved in a file with ***.crv** extention using the **Save** button (in folder containing the input raster by default), and apply saved transformations for other rasters using the **Load** button (loading saved **.crv** file).
After all the settings are done, press the **Apply** button.

The button opens **Brightness-Contrast-Gamma** window, designated for setting the corresponding characteristics for each image channel, or for all channels at once. Checked **On fly** option displays the raster changes "on the fly", without pressing the **OK** button.



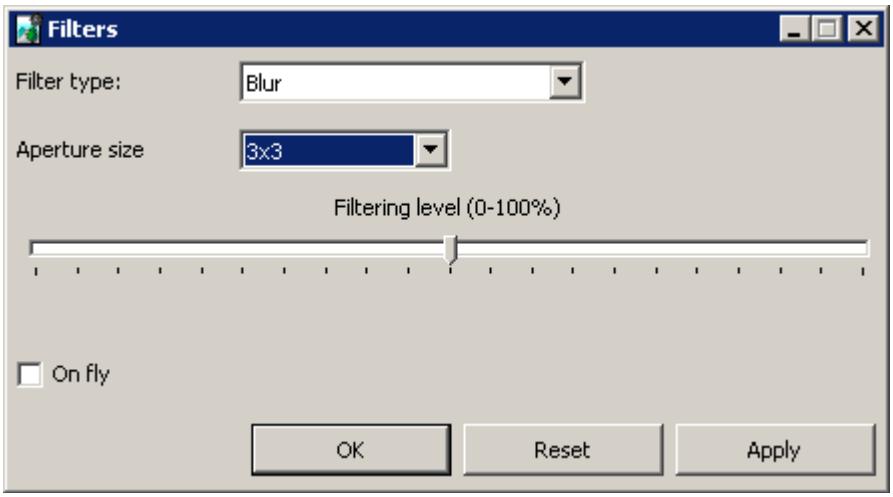
Brightness-Contrast-Gamma window

To adjust the color balance of image the window opened by pressing the button (**Color Balance)** is used. Color balance of images may be adjusted in the direction of blue, red, purple, green, yellow or blue. The overall brightness is not changed. Also the balance shift for each color component can be entered in numerical form from -100 to 100.



Color balance window

The button (**Filters**) opens a window, designated to improve the visual qualities of the source image with the help of various filters.



Filters window

In the **Filter type** drop-down list, select the type of processing. There are the following filters available:

- **Blur** - for blurring the details of the source image;
- **Gaussian blue** - another type of smoothing filter, the distinguishing feature of which is that the transfer characteristic is not a linear function (as in the first case), but a part of the Gauss function ("Bell");
- **Sharpen** - allows user to highlight and sharpen the distinction between the different parts of the image;
- **Sharpen edges** – the same as **sharpen** filter, but filtering is performed only when brightness difference between image details is above a certain level. It suits well for emphasizing borders of objects uniformly textured inside (e.g. fields) - this filter does not make noticeable changes to this inside parts.
- **Median** - nonlinear filter suitable mainly for filtering discrete disturbances (single pixels with erroneous sample value);
- **Sobel** – nonlinear differentiating filter which represents a derivative of the image. It is used to obtain contour frames on image in raster form.

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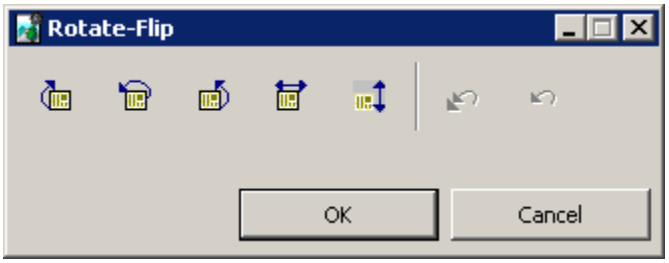
Use **On fly** checkbox to make all changes in parameters be shown in the main window.

For image geometry transformations, use the button (**Rotate – flip**). It opens the Rotate – Flip window allowing to set rotation angle or apply horizontal or vertical mirroring to the images. Undo for the most recent or all of these operations is also available with respective buttons.



Geometric transformations window

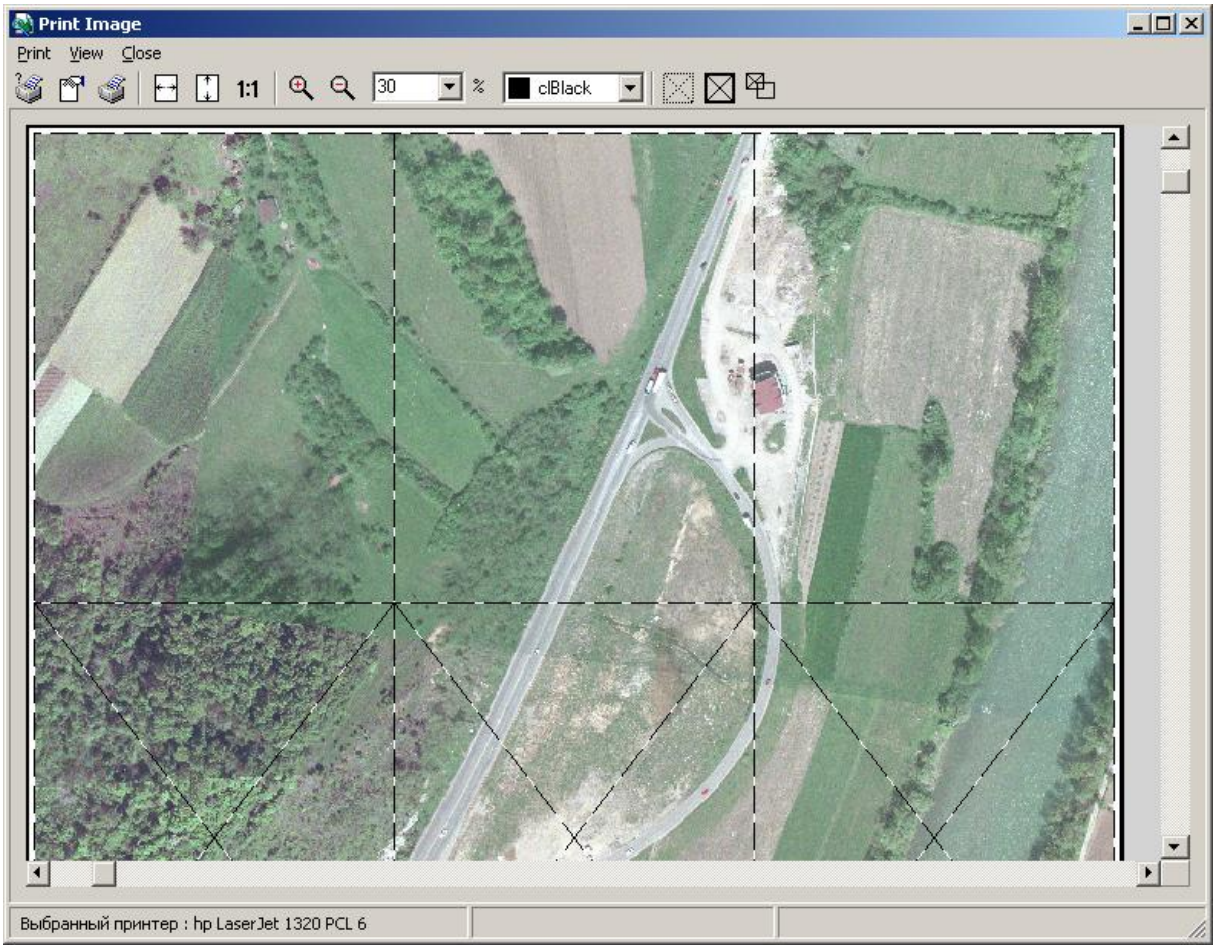
Having obtained satisfactory result with those tools in the **Radiometric correction** window, press the **OK** button to return to **PHOTOMOD Raster Converter** main window (see chapter PHOTOMOD Raster Converter).
Correction settings may be saved and then applied to other images without the need to open these images in Radiometric correction window and repeated manual adjustments for each image. Select an image with applied correction in the PHOTOMOD Raster Converter files list and press button (**Save correction parameters for selected image**). A save file dialog appears for selecting name for the **rmc**-file which would contain correction parameters (by default the folder of the source image is offered to save into). Then select images in the list which you wish to apply correction to, and press button (**Load correction parameters for selected images**). An open file dialog is brought up. Select the saved **rmc** file and press OK.

The described procedures are not the only place to adjust images, other PHOTOMOD modules allow adjusting brightness/gamma/contrast and color balance images, while **PHOTOMOD Mosaic** has advanced tools for radiometric correction.

Radiometric correction can be applied to images being added to PHOTOMOD project as well, see documentation for PHOTOMOD Core, description of adding images to project process, which has functions identical to capabilities of PHOTOMOD Raster Converter.

11.3 Image printing

PHOTOMOD Raster Converter, as well as **Add images** window in PHOTOMOD Core, are capable of printing raster images. Press the (**Print**) button in the preview pane for the selected image to open the **Print Image** window.



Printing settings window

- printer setup – open printer selection and setup window. Also activated by **Ctrl-C** shortcut.

- parameters – open **Printing** settings dialog, see 14.1.1 Printing settings.

- start print – starts printing image (or chosen sheets only) according to predefined settings

- fit width – shows complete image fitting to width in print settings window

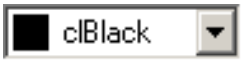
- fit height – shows complete image fitting to height in print settings window

- 1:1 – displays the image in the print window, in a scale of 1:1 (pixel image corresponds to the screen pixel)

- zoom in – zoom in the image in the window

- zoom out – zoom out the image in the window

- drop-down list for choosing image scale (in %)



- drop-down list for choosing color of printed sheet's borders

- turn all pages off

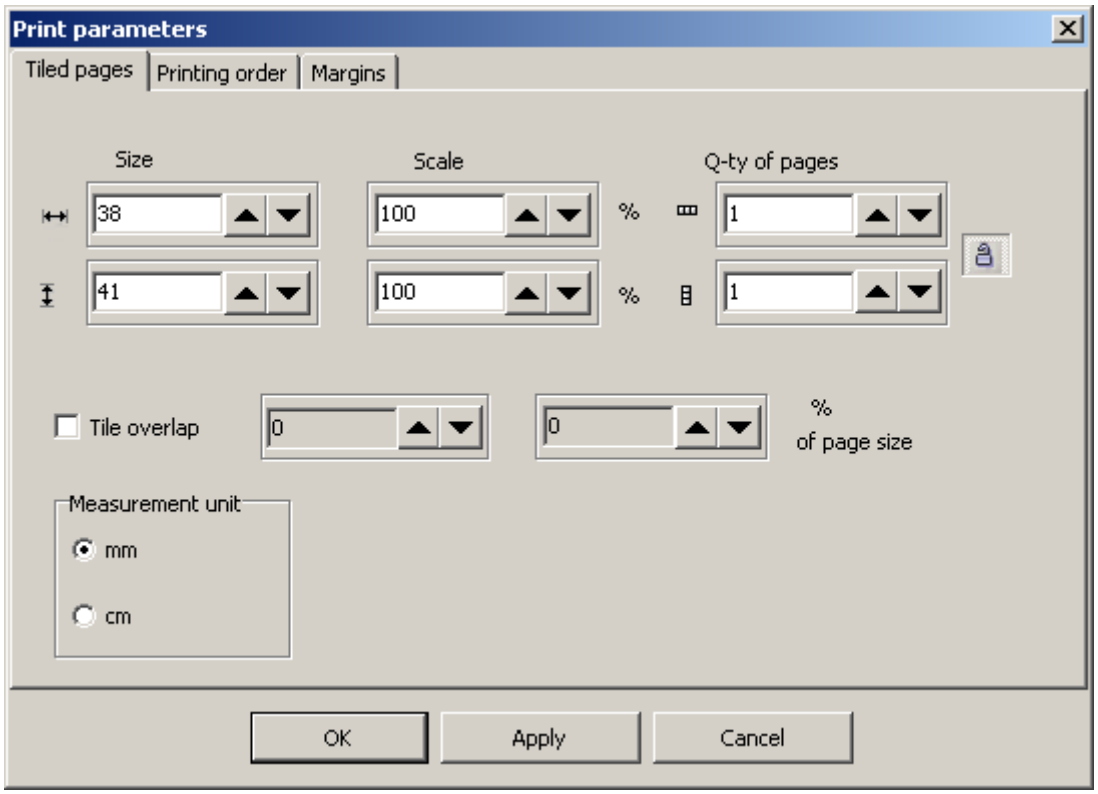
- turn all pages on

- invert selection

Individual pages can be included / excluded from printing by clicking on page image while pressing **Ctrl** button. Clicking the right mouse button on selected page makes a contextual menu appear with **Print this page now** command, which prints the page upon clicking.

11.3.1 Printing settings

To set printing options for image, currently open in **RasterView** program, choose **Print | Parameters** menu item or click **(Parameters)** toolbar button, so that a window appears.

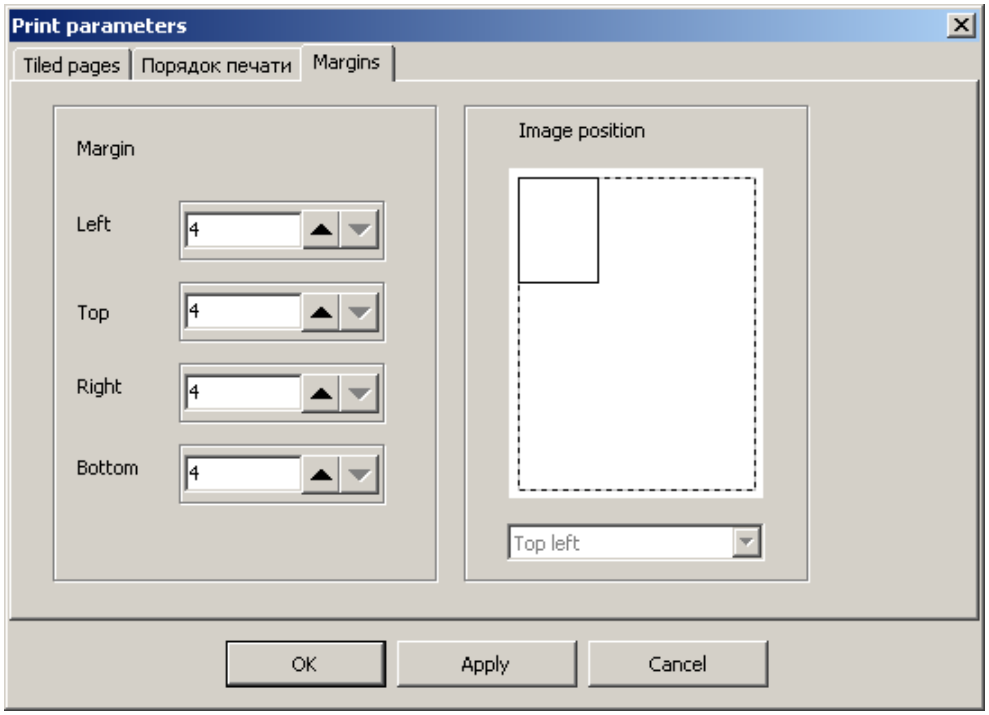


Printing parameters

Tiled pages tab can be used to customize division of the original image into pages.

Printing order tab is intended to specify the printing order for image pages.

Margins tab is used to adjust image indentations from page borders and bind printed image to paper corners.



Selecting page margins

12. PHOTOMOD 4.x projects converter

Projects from legacy versions of **PHOTOMOD 4.x** can be imported in **PHOTOMOD 5.0**. For the converter to work an installed and properly configured PHOTOMOD 4.x must exist on the workstation, with connected storages containing projects to convert. Projects can be converted in batch mode, i.e. import several projects as one operation. The projects converter main window allows selecting projects and choosing options for placing converted projects and images. Conversion is a separate application not interfering all other **PHOTOMOD** activity.

Note: Saving the converted projects and images from the resources of active profile is not proposed during the converting projects from 4.x version. Specify the real directory to store the converted projects in advance and connect it via the virtual folder in the Control Panel to profile before or after the conversion. The images also must be in the profile resources. The connection of dedicated virtual folder for the images depends on images location settings which are specified.

Start the utility from the **Start | PHOTOMOD 5 | Converter PHOTOMOD 4.x projects** menu to open the converter. In addition the converter window can be opened from the **Project | Convert 4.x project** menu or from **Projects management** window in the **PHOTOMOD Core**.

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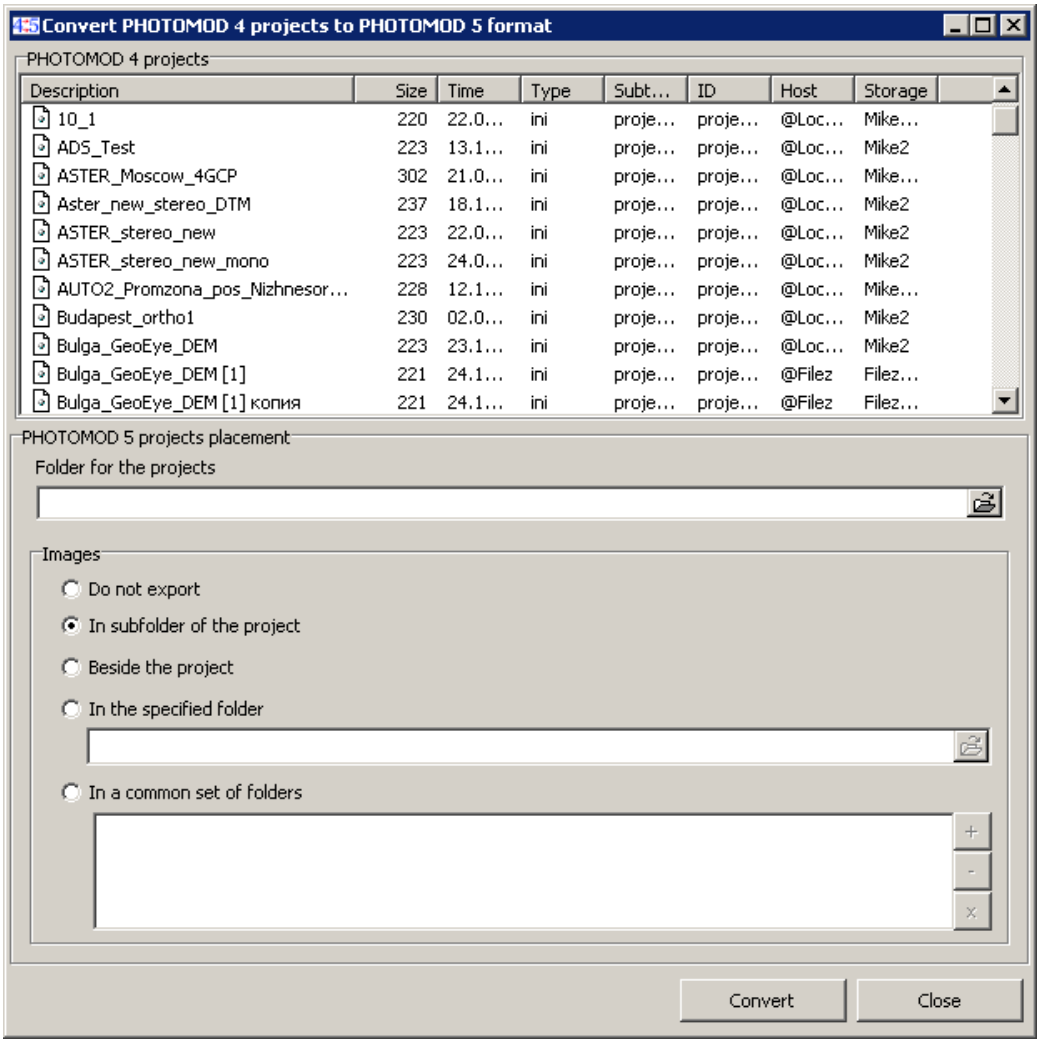

Convert PHOTOMOD 4 projects to PHOTOMOD 5 format
PHOTOMOD 4 projects
Description Size Time Type Subt... ID Host Storage
10_1 220 22.0... ini proje... proje... @Loc... Mike...
ADS_Test 223 13.1... ini proje... proje... @Loc... Mike2
ASTER_Moscow_4GCP 302 21.0... ini proje... proje... @Loc... Mike...
Aster_new_stereo_DTM 237 18.1... ini proje... proje... @Loc... Mike2
ASTER_stereo_new 223 22.0... ini proje... proje... @Loc... Mike2
ASTER_stereo_new_mono 223 24.0... ini proje... proje... @Loc... Mike2
AUTO2_Promzona_pos_Nizhnesor... 228 12.1... ini proje... proje... @Loc... Mike...
Budapest_ortho1 230 02.0... ini proje... proje... @Loc... Mike2
Bulga_GeoEye_DEM 223 23.1... ini proje... proje... @Loc... Mike2
Bulga_GeoEye_DEM [1] 221 24.1... ini proje... proje... @Filez Filez...
Bulga_GeoEye_DEM [1] копия 221 24.1... ini proje... proje... @Filez Filez...
PHOTOMOD 5 projects placement
Folder for the projects
Images
Do not export
In subfolder of the project
Beside the project
In the specified folder
In a common set of folders
Convert
Close

Project converter main window

In the PHOTOMOD 4 projects section select the project (use the Ctrl, Shift buttons for projects selection) for conversion. Next, the output folder of file system, in which for each project is created the *subfolder with project name* to store the converted project files, is specified in the **PHOTOMOD 5 project placement** section. The Images section contains options for placing converted project images (Do not export, In subfolder of the project, Beside the project, In the specified folder, In a common set of folders).

In any case, for images to be loaded when the converted project is opened in PHOTOMOD 5.0, they must be contained in the profile resources. If the system recognizes relative paths to project images correctly, the images are loaded without any more manual intervention. Otherwise it is necessary to set up project paths to images with ImageWizard, which operates on profile resources only.

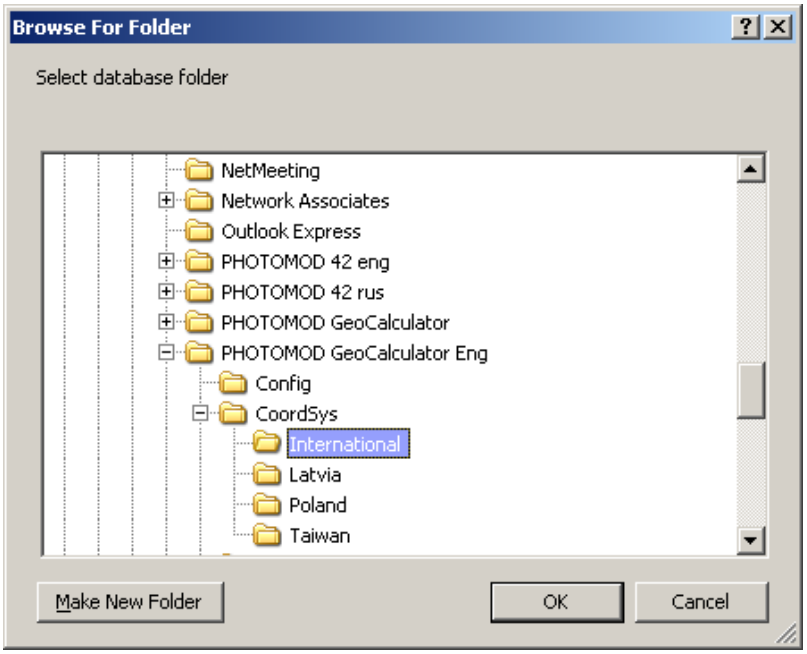
A detailed description of the converter 4.x projects as well as of options for placing / connecting images to the project is contained in the appropriate chapter of the **Project creation** User manual.

13. Geodetic calculator

An additional **PHOTOMOD** system utility, used for recalculating of ground control points coordinates from one coordinate system into another.

Geodetic Calculator is started from Windows Start menu: **Start | Programs | PHOTOMOD | Geodetic calculator**. It also can be started from PHOTOMOD Core via the **Service | Geocalculator** menu command.

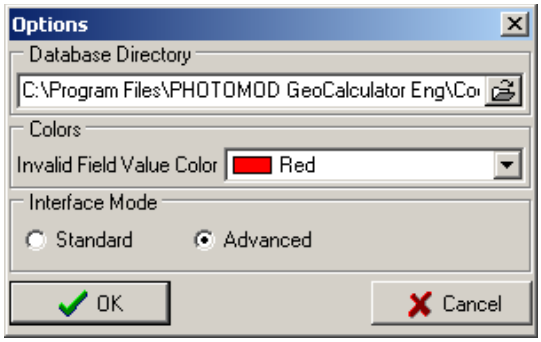
At first program launch you should specify the path to folder containing coordinate systems database in the window appeared.



Selection of folder with coordinate system database

Then the dialogue of the program settings is opened, (also could be opened using menu command **Tools | Options**, or the icon **Options**). Upper panel of the window – **Database directory** – shows the path to the database folder and allows to change it if needed.

If coordinates calculations have poor result the field with invalid value is shown in red color (by default) or by color selected in drop-down list in **Colors** panel.



Program settings

Interface mode panel allows to select one of two working modes: **Standard** and **Advanced** which have different set of menu commands (appeared after pushing **Database** menu option) for work with coordinate systems database.

Standard set of **Database** menu contains the following items:

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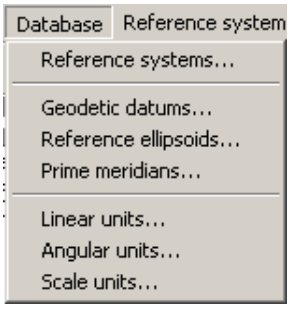
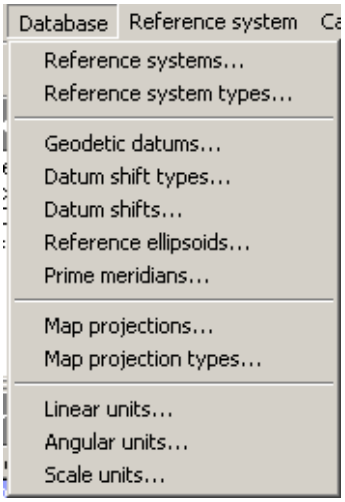
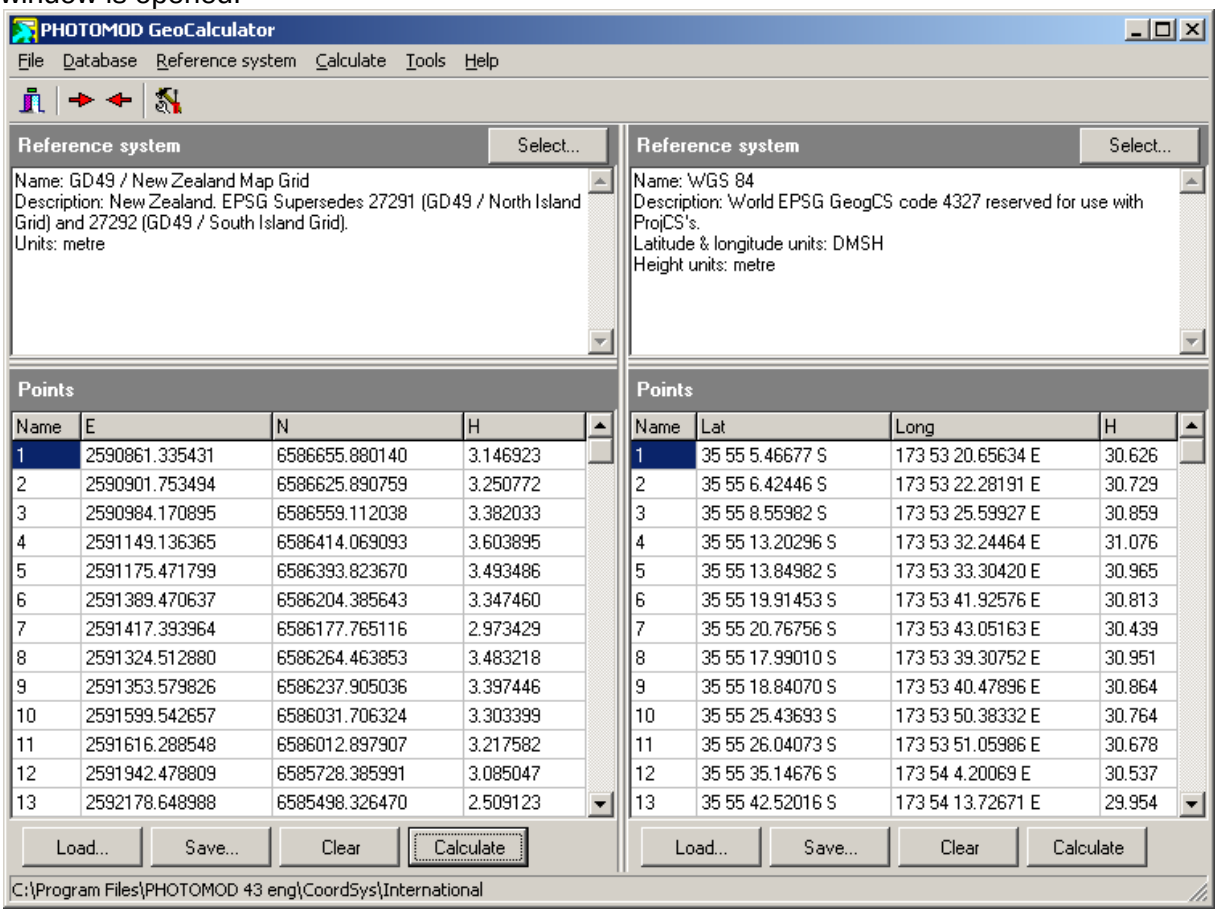


Advanced set of **Database** menu contains the following items:



After pushing the button **OK** in **Options** window the main **PHOTOMOD GeoCalculator** window is opened.

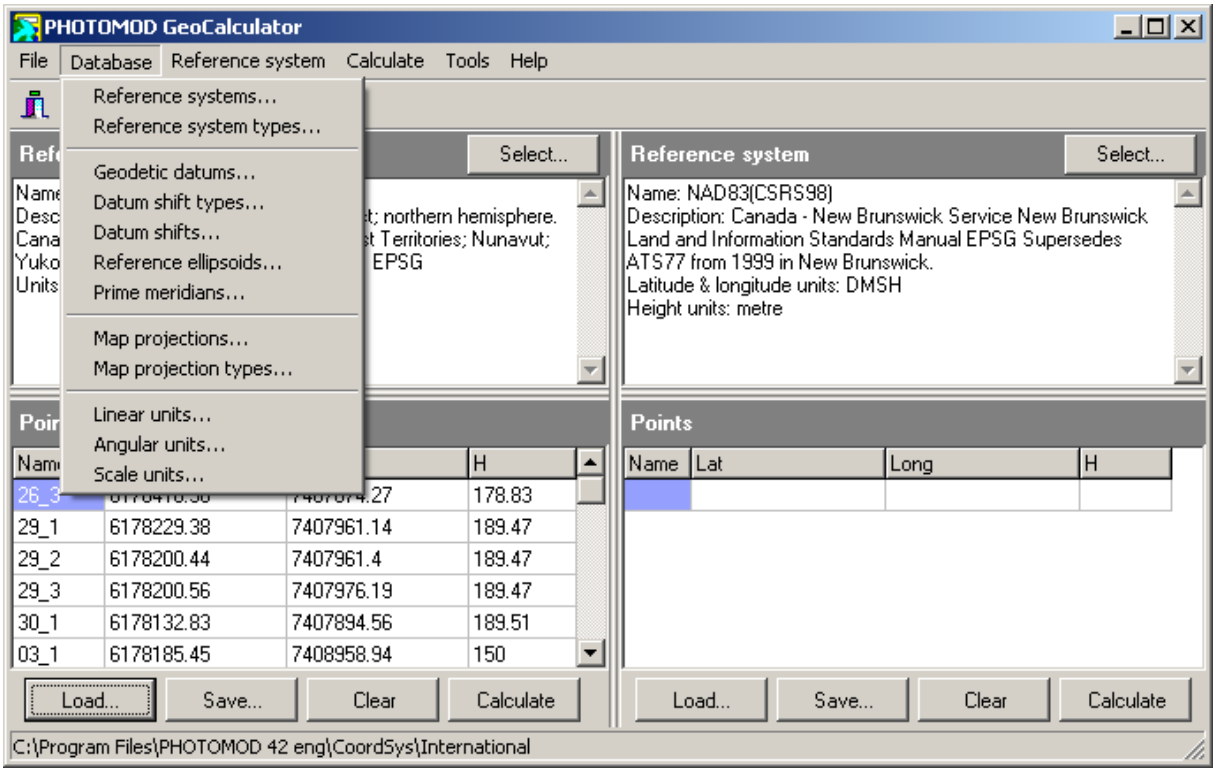


Program window consists of two panels – left and right. One of them is intended for initial GCP data input and the other – for displaying of recalculating results.

For example, you have initial GCP coordinates set in geodetic coordinate system (Lat, Long, H). In order to re-calculate them into Cartesian, which are acceptable in **PHOTOMOD** system you should do the following.

Push the **Select** button in **Reference system** field of the left panel and select coordinate system of input GCP's. Then load ASCII file with points coordinates (the **Load** button in left **Points** field).

In the right panel in **Reference system** field exactly in the same way select the output coordinate system (from Cartesian ones available, for example) and recalculate the coordinates (the **Calculate** button under left **Points** field or the icon **Calculate from left to right**). After that, new GCP coordinates appear in the right **Points** field. You can save them in txt file (the **Save** button under right **Points** field) and use then in further work with **PHOTOMOD** project.



Operations of point's coordinates selection and recalculation may be performed both from left to right panel (as described above) and vice versa – from right to left panel. In the latter case use the icon **Calculate from right to left**.

Moreover, **GeoCalculator** program allows to view, select, edit and also export/import coordinate system databases, using commands of the **Database** menu item.

14. Equipment for stereo measurements

The task made in stereomode is the most laborious part of PHOTOMOD project processing. Two stereomodes are available: anaglyph and page-flipping ones.

To perform the stereo processing efficiently, special equipment is required; it should be appropriately set up as described below.

14.1 Video cards

Depending on the tasks to be solved, various graphics adapters can be used to work with **PHOTOMOD**. See the list of supported adapters below.

Nvidia Quadro FX 5800
Nvidia Quadro FX 5600
Nvidia Quadro FX 4800
Nvidia Quadro FX 4600 (works)
Nvidia Quadro FX 3800 (works)
Nvidia Quadro FX 3700
Nvidia Quadro FX 1800
Nvidia Quadro FX 1700
Nvidia Quadro FX 580 (BIOS firmware upgrade required)
Nvidia Quadro FX 570 (recommended)
Nvidia Quadro FX 380 (not tested)
Nvidia Quadro FX 370 (not tested)

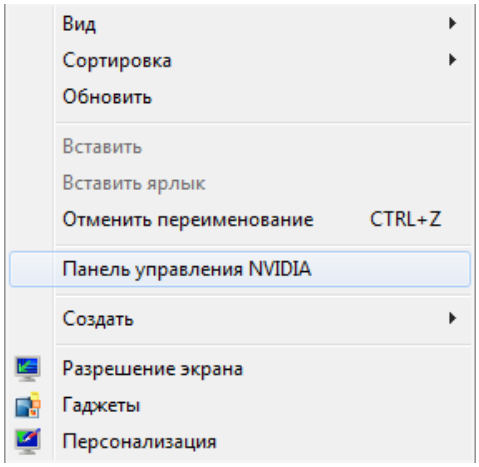
Note. Videocards Nvidia of GeForce series do not support page-flipping stereo mode

Actually the list of video cards in the table is not complete. However the out-of-list video card may need some adjustment and testing.

Note. Quadro 4 videocards are not supported with Windows 7 and Windows Vista.

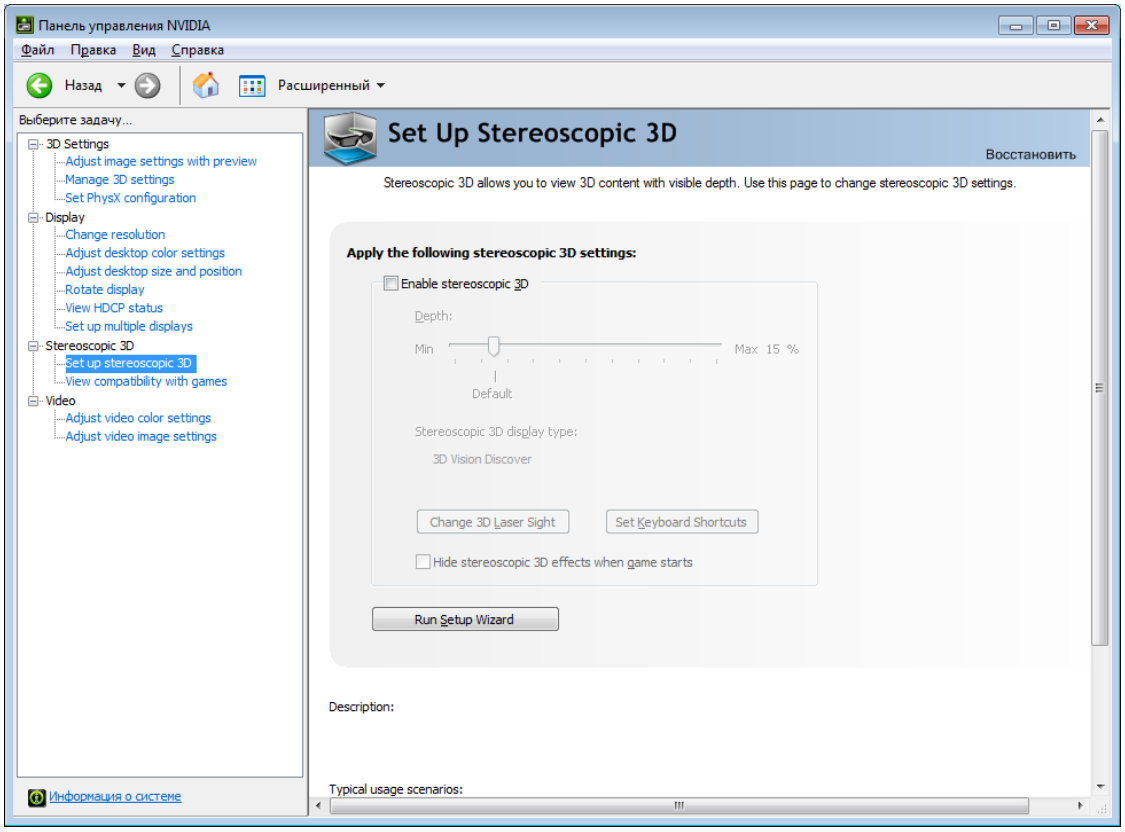
14.1.1 General driver setup

This section contains requirements to general videocard driver settings related to all types of monitors.
For the stereomode to function properly, it is necessary to set up the videocard driver correctly. To start setting up the driver, one should click right mouse button on an empty area of Windows desktop to bring up a context menu, and choose **NVIDIA control panel** command in the menu.



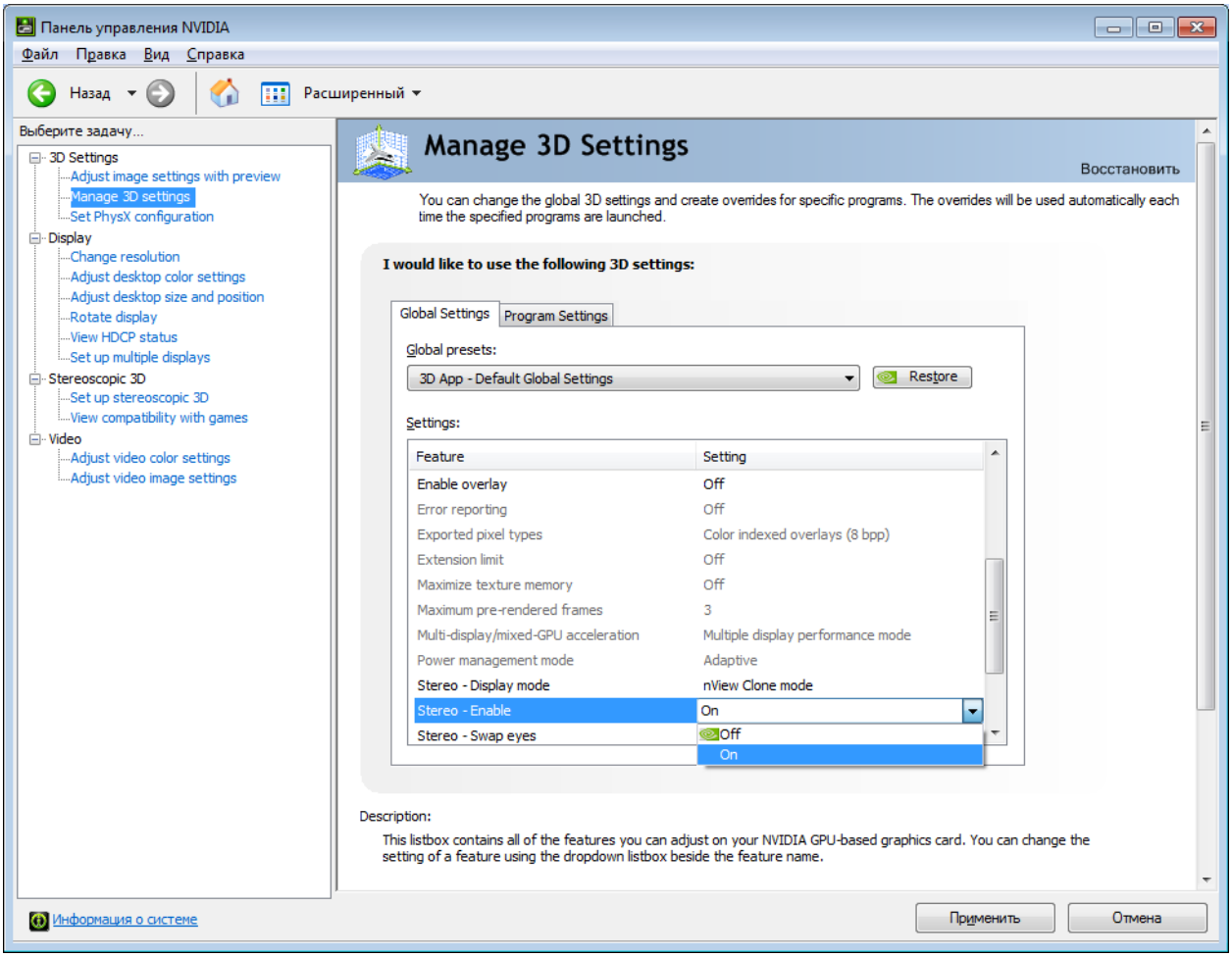
Launching NVIDIA control panel

First of all, regardless of video card (see list in chapter Video cards) and display used, it's necessary to ***turn off*** **Stereoscopic 3D mode**.



Stereoscopic 3D mode settings

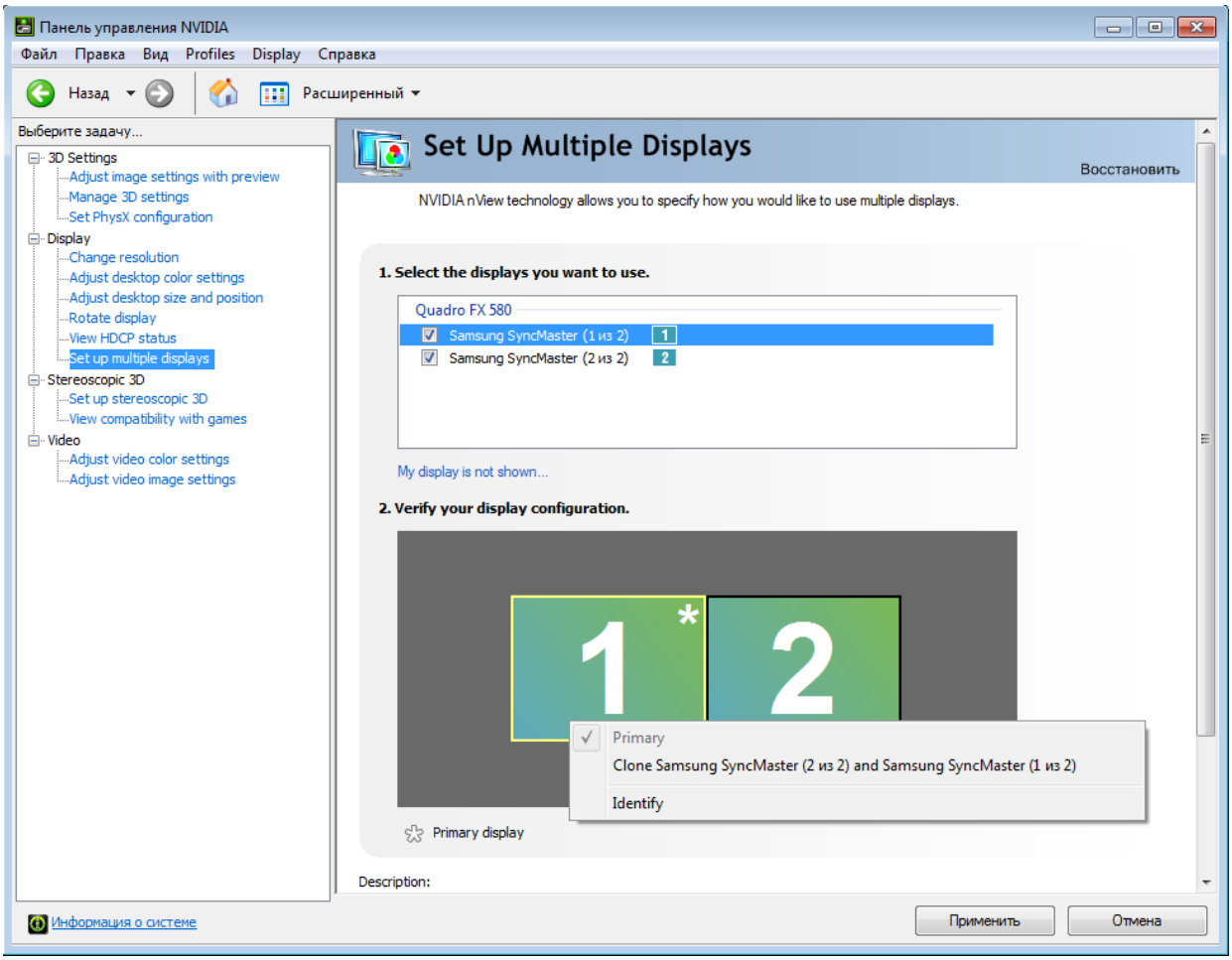
Further you should select menu **View** - **Extended** in the NVIDIA control panel window. After this is done, task list in the **3D parameters** menu would contain an additional option **3D Parameters management** - **Global settings**. On this tab you should verify the settings: **Stereo** - *On*, **Stereo** - **dispaly mode –** *use stereoglasses*.



14.1.2 Videoadapter driver settings for StereoPixel and Planar monitors

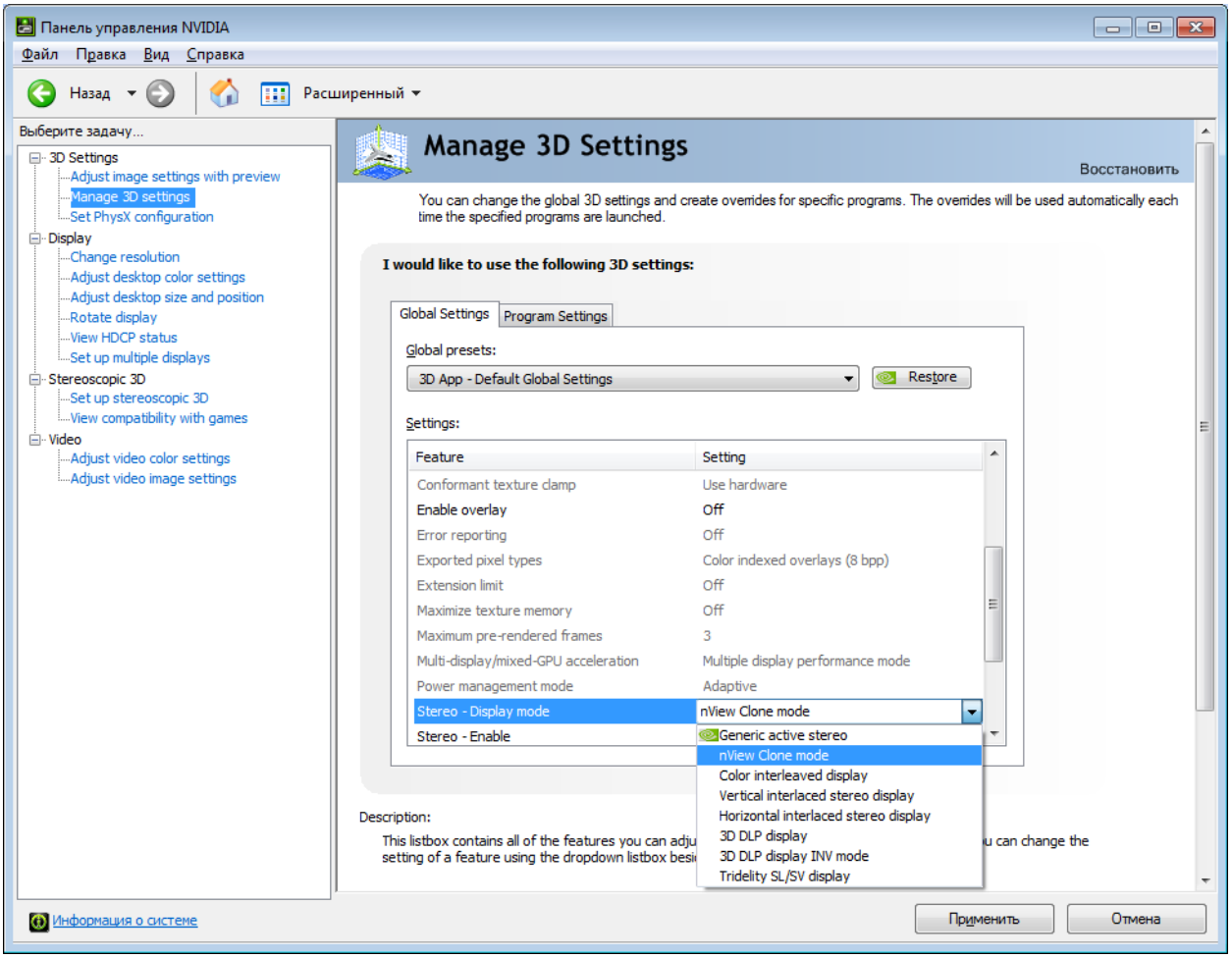
StereoPixel LcReflex-20 3D monitor

Apart from the requirement described above, using this type of monitors you should do following: select **Set multiple displays** in the drop-down list **Display**. Then in the section **2** of the settings select the first display image and right-click it and select **Clone** mode in the context menu.



Setting multiple displays

Having set multiple displays you should set option **Stereo** - **display mode** to **nView Clone mode**.

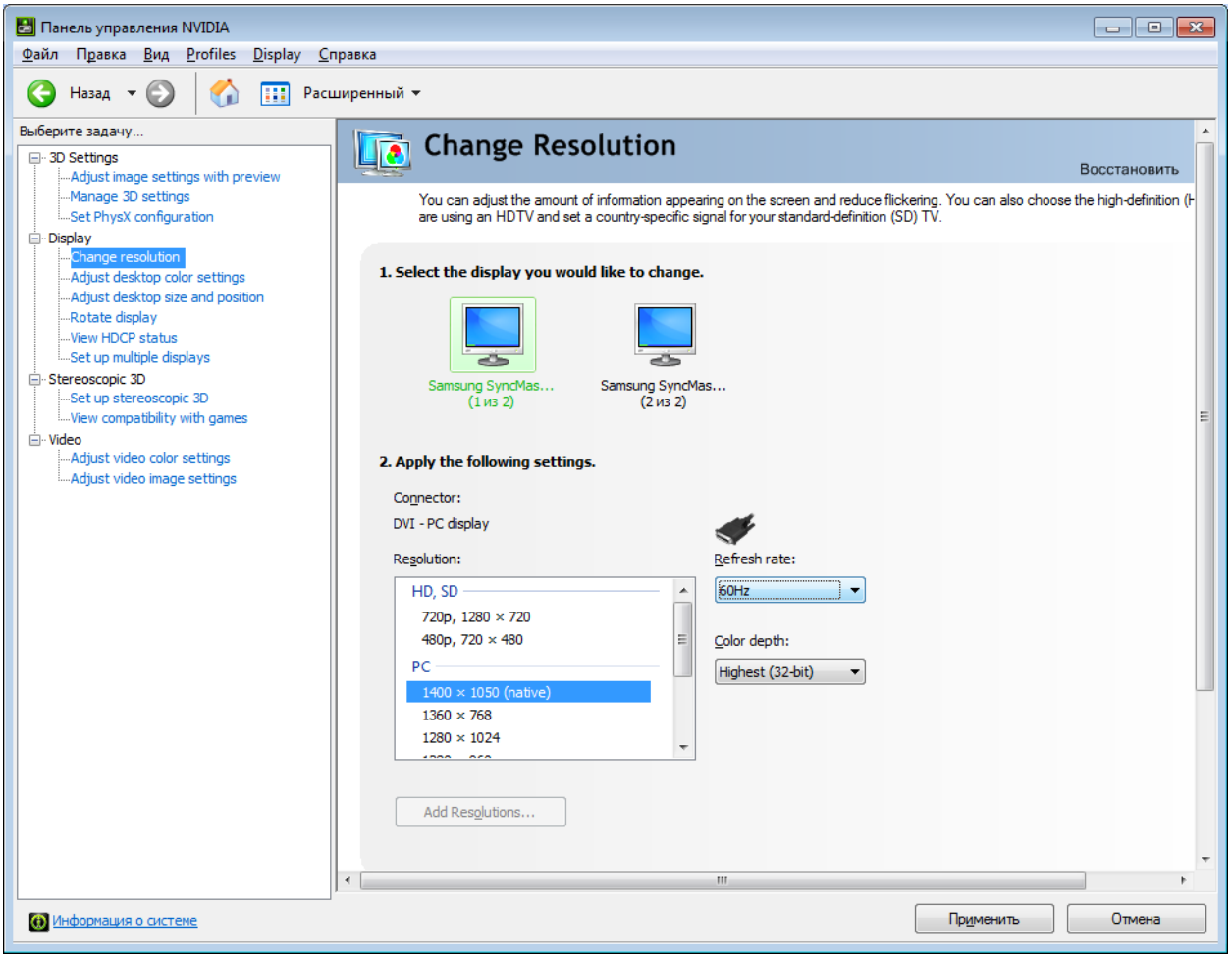


Stereo - **display mode** option for monitors like StereoPixel LcReflex-20, Planar etc.

The monitors are provided with special polaroid glasses for stereoscopic measurements. This type of glasses is intended for work in page-flipping stereo mode. Its advantages are high-quality stereoviewing and that the recharging and power supply are not needed. The drawback is the limited operator's head position to view the stereoscene.

14.1.3 Videoadapter drives settings for displays Sumsung Syncmaster 2233RZ, ViewSonic VX2268wm and other supporting the frequency of 120 Hz

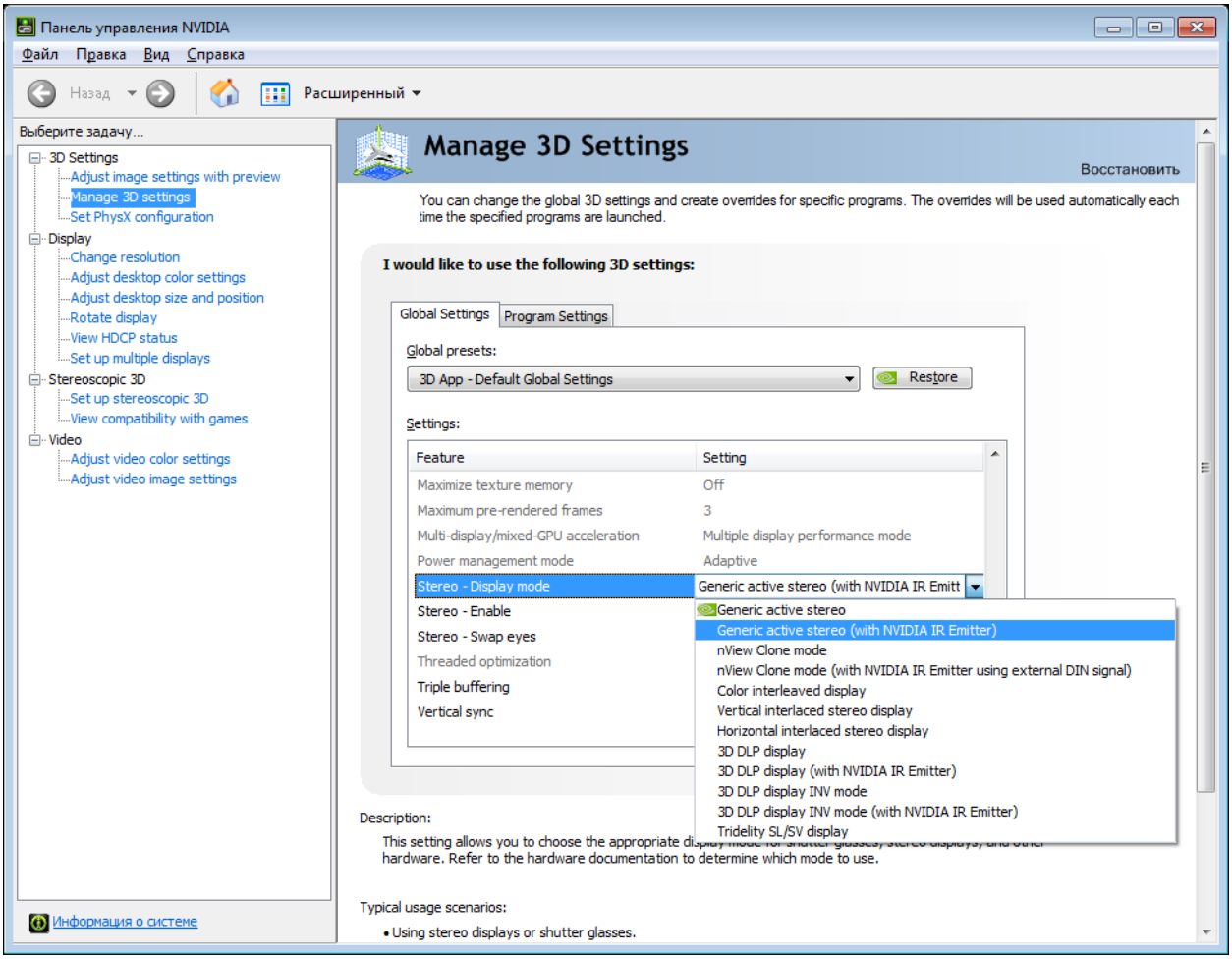
Using that displays you should set parameter **Display** - **Change resolution** - **Refresh frequency** to 120 Hz in the NVIDIA control panel.



Refresh rate settings

Then you should set **Stereo** - **display mode** to **Standard active stereo** (**using NVIDIA IR-emitter**).

Note: the mode becomes available provided that the glasses drivers are correctly installed and the IR-emitter connected to USB port.



Option **Stereo** - **display mode** for monitors Samsung Syncmaster 2233RZ, ViewSonic VX2268wm and others with refresh rate of 120 Hz.

To use the monitor the special glasses are required - shutter glasses GeForse 3D Vision. The glasses are intended to work in the page-flipping stereo mode. The glasses are wireless, and require recharging through USB port. The glasses are provided with USB IR-emitter.

Shutter glasses 3D Vision

14.1.4 Other tools for work in stereo

Apart from monitors mentioned above, you can work with PHOTOMOD 5.0 using any monitors and glasses supported by previous PHOTOMOD versions except for those using interlace stereo mode.

PHOTOMOD 5.0 also supports anaglyph stereomode that does not required special videoadapters and monitors; you can use any red and blue ahaglyph glasses. The drawback of that mode is that you can't see color in stereo mode, and that the image looks dark due to the color filters used in the glasses.

Anaglyph glasses

14.2 Mice and hand wheels adjustment for stereo processing

Since 3D feature extraction is a time-consuming process, it requires the system to be as ergonomic as possible. Beside using hot keys or icons of the main menu PHOTOMOD system provides a useful capability to setup mouse or special equipment (sets of hand wheels/foot pedals) for performing of different operations in stereo mode.

Output effectiveness is increasing significantly when applying the special 3D mice or hand wheels/foot pedals to the terrain features stereo extraction due to their convenient handling and precise marker positioning on and also using one-touch keys for quick operations launching. That allows the operator to focus only on image processing and avoid working with keyboard and standard mouse. You can use either ordinary 3-button or 5-button mice or special 3D mice as well as hand wheels/foot pedals for work in stereomode – see next chapters for detailed description. In fact you can setup any mouse emulating the standard 5-button one.

To set up your mouse or hand wheels/foot pedals select menu item **Service | Mouse setup** in **PHOTOMOD Core** module to bring up the **Mouse setup** window:

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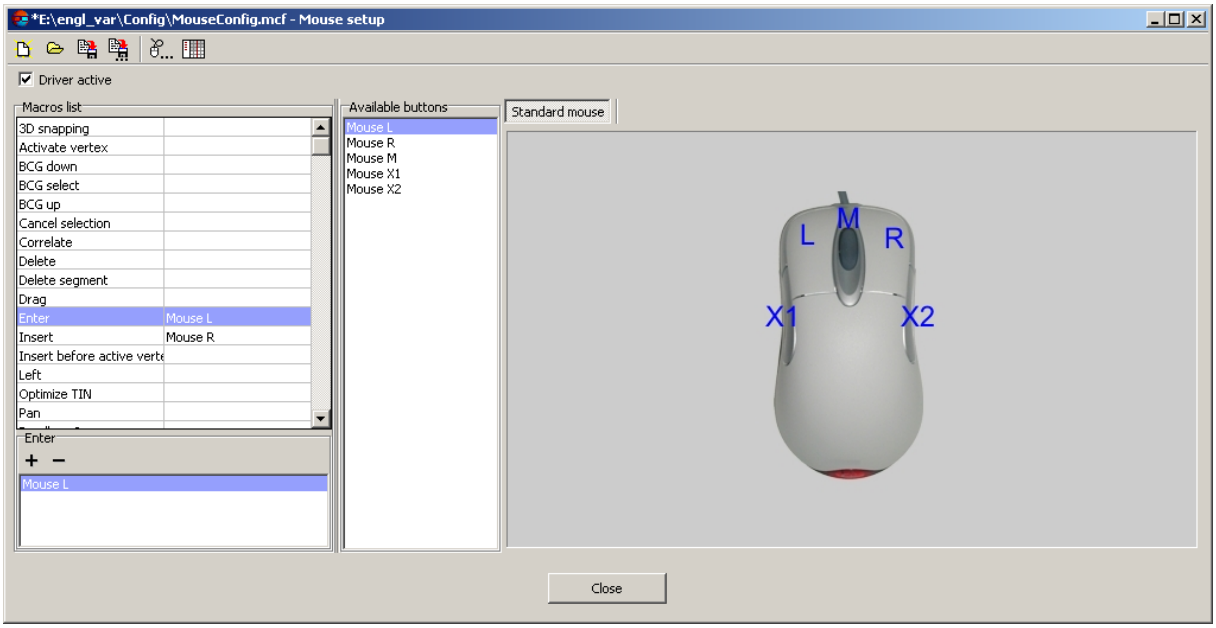


Mouse setup window

This window is used to set up any mouse buttons or foot pedals for executing operator's actions during stereo processing and then to save these settings in special file – mouse driver for further use. Driver with standard mouse actions is loaded by default (it is storing in PHOTOMOD.VAR\Config\MouseConfig.mcf, this path is shown in the window title), and could be used as a template for creating and saving customized settings. Upper button bar contains icons used for the following operations:

- new configuration – allows to create new configuration of settings for selected mouse, as described below.

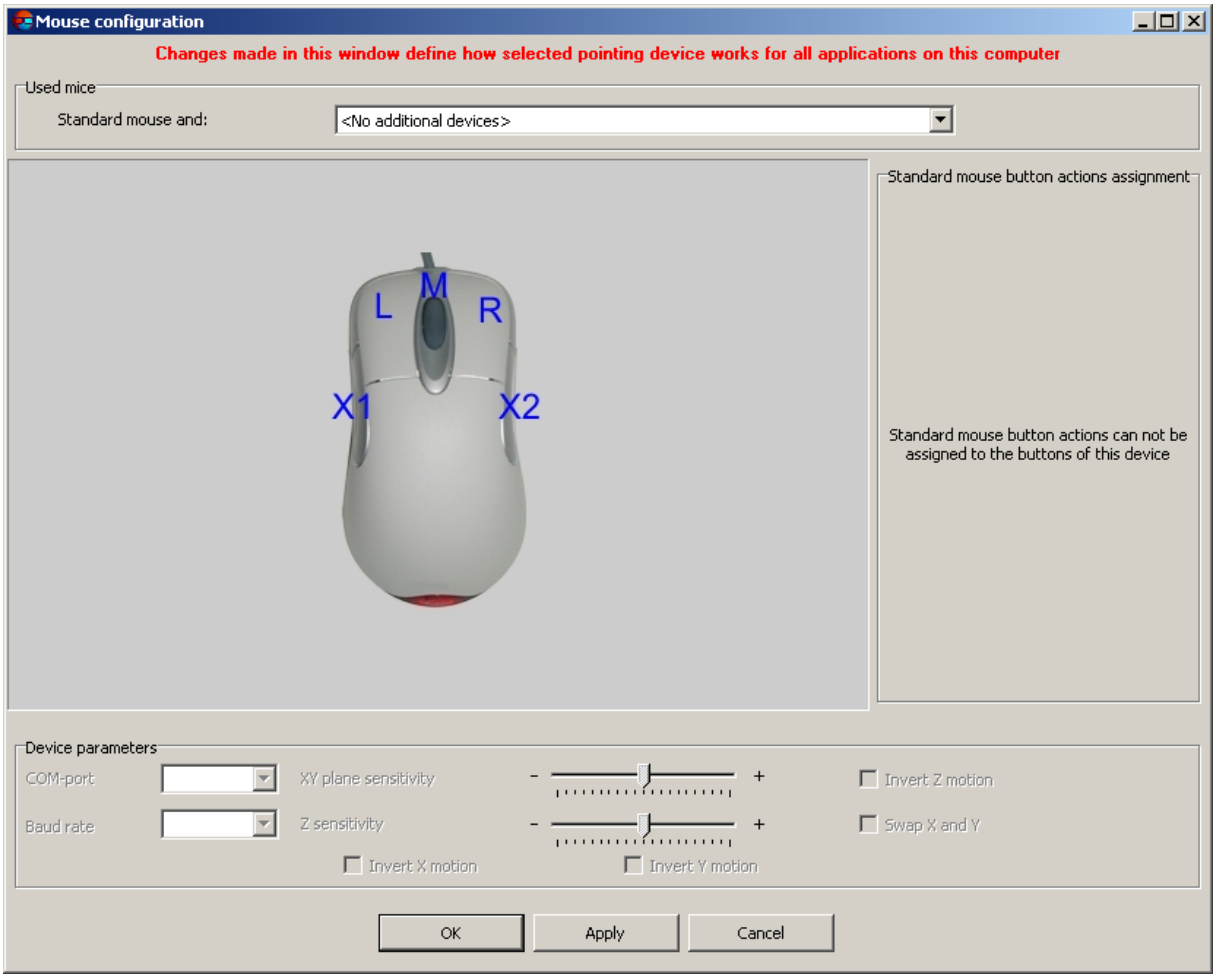
- open – opens the dialogue for choosing and opening file with mouse driver

- save – saves mouse configuration change into current driver

- save as – saves new configuration of mouse buttons or changed current configuration in new driver file to specified disk location.

- Macro editor – opens **Macro editor** window, see the chapter Macro editor

- Device setup – opens **Mouse setup** window, used for selecting and adjusting of mice and/or hand wheels, see description below. Besides, you can open mouse setup window using context menu command **Mouse configuration** in **PhMonitor** module in OS Windows system tray, see the chapter PHOTOMOD System Monitor module.



Mouse configuration window

In this window in **Used mice** field you can select device to be used on your machine along with standard mouse:

- **No additional devices** – if only standard (three or five button) mouse is used for work – see settings description in the chapter Three and five button mice

If it is supposed to use standard mouse along with special mouse or with hand wheels\foot pedals, select the device type from the following:

- **Immersion SoftMouse** – see settings description in the chapter Immersion SoftMouse
- **GeoMouse** – see settings description in the chapter GeoMouse
- **Stealth 3D Mouse** – see settings description in the chapter Stealth 3D mice
- **Immersion compatible hand wheels/foot pedals**, see settings description in the chapter Immersion compatible hand wheels and foot pedals
- **Hand wheels/foot pedals "Vector-A" (EOMZ)**, see settings description in the chapter Hand wheels and foot pedals "Vector-A"

If one of the special mice or hand wheels\foot pedals has been selected, their image is appeared in the window. Use **Parameters** panel to set up some of their parameters.

After device selection and its initial setup push the **Apply** and **OK** buttons to apply changing. Then you can make settings of other device's buttons in **Mouse setup** window, as described in the following chapters.

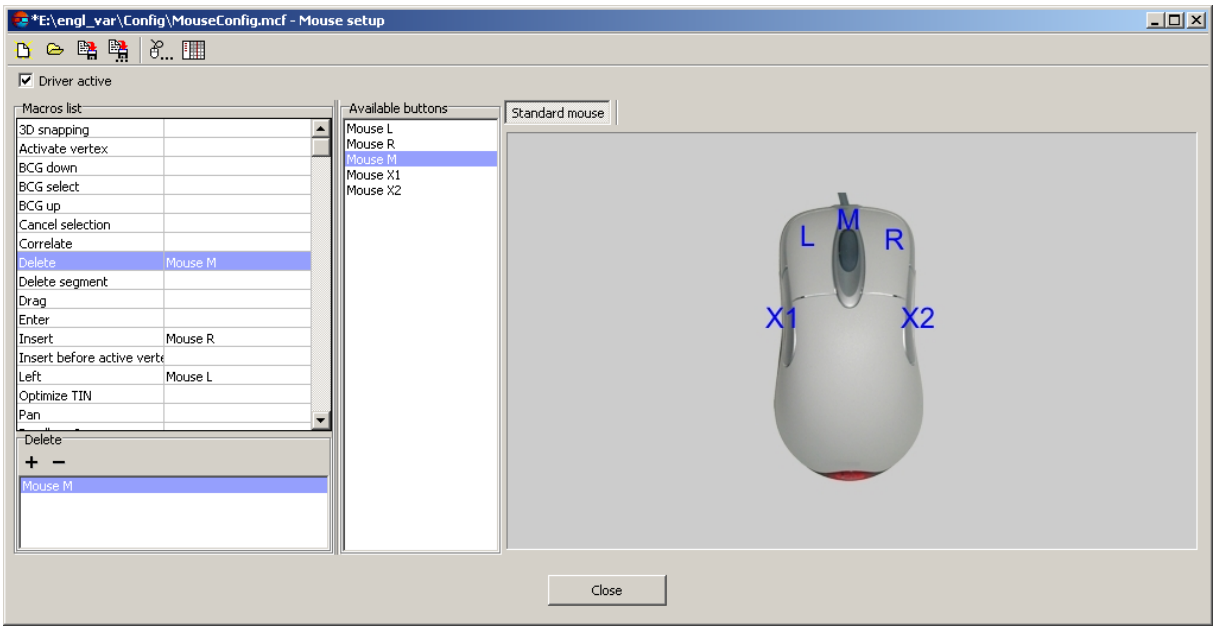
14.2.1 Three and five button mice

To set up standard mouse select menu item **Service | Mouse setup** (in **PHOTOMOD Core**, **PHOTOMOD DTM**, **PHOTOMOD StereoDraw** and **PHOTOMOD StereoVectOr** modules)

after that **Mouse setup** window appears, see the chapter Mice and hand wheels adjustment for stereo processing.

If it is necessary to assign actions to standard mouse buttons, which are not included to default mouse driver, you can do the following.

Open the **Mouse configuration** window, by pushing the button , select the option **No additional devices** and push **OK**.



Mouse setup window

In **Mouse setup** window you can see the image of standard mouse with scheme of its buttons, the list of names of mouse's buttons in the **Available buttons** list, and also list of available operations (macro's) stored in default mouse driver in **Macros list**.

To assign new macro to chosen mouse button, select the action in **Macros list**, then select mouse button in the **Available buttons** list, and assign the action to the button by pushing the icon **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon **Delete binding**.

When all necessary actions are assigned to the mouse buttons, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

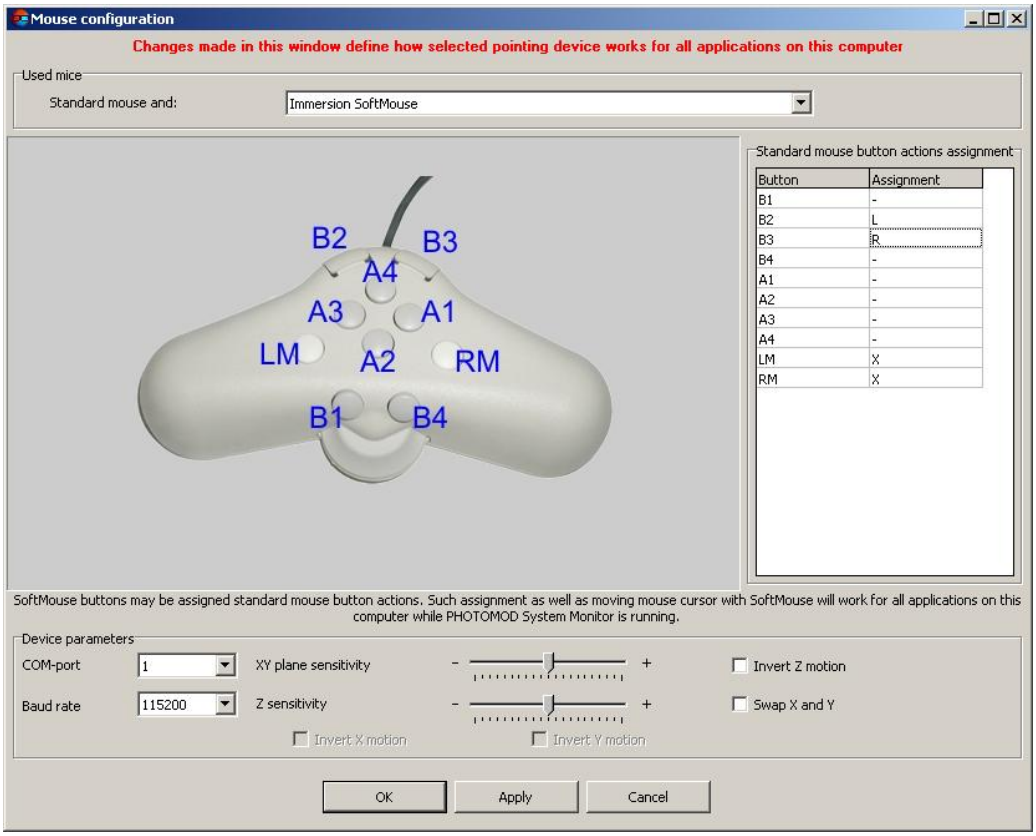
You can also create new action if necessary and save it into macro in **Macro editor** window, which is opened by the button in the **Mouse setup** window, see the chapter Macro editor.

14.2.2 Immersion SoftMouse

Immersion SoftMouse (produced by Immersion company, see www.immersion.com) could be used for 3D photogrammetric processing in PHOTOMOD system.

Delivery set of this mouse includes interface device for mouse connection to COM-port, power unit and mouse itself.

After installation of Immersion SoftMouse to your PC, turn PC on and run **PHOTOMOD System Monitor** module. Then open the window with mouse settings (menu command **Service | Mouse setup** in **PHOTOMOD Core** module), push the **Device setup** button and select **Immersion SoftMouse** in **Used mice** field, see the chapter Mice and hand wheels adjustment for stereo processing.



Immersion SoftMouse setup in **Mouse configuration** window

Then in **Device parameters** panel select its COM-port and baud rate, and adjust mouse and wheel sensitivity using an appropriate sliders. Here you can also setup left or right mouse wheel move for changing marker height (Z coordinate) during vectorization, using appropriate radio button.

Use **Standard mouse button actions assignment** panel to the right to assign actions of the standard mouse buttons to the **Immersion SoftMouse**. Select **Immersion SoftMouse** button in **Button** column (button names and their location are shown on leftward picture), and in the appropriate cell of **Assignment** column select necessary button of usual mouse by double click in the following way. The first double click will assign left button click (symbol **L** will be shown in the **Assignment** cell), the next double click will assign left button click (symbol **R** will be shown in the **Assignment** cell), the next one – middle button click (symbol **M**).

Such assignment as well as marker move by **Immersion SoftMouse** will be valid for all applications on your PC, while **PHOTOMOD System Monitor** is running.

After that push **Apply** and **OK** and open **Macro editor** in **Mouse setup** window, if you need to create new macro, see the chapter Macro editor.

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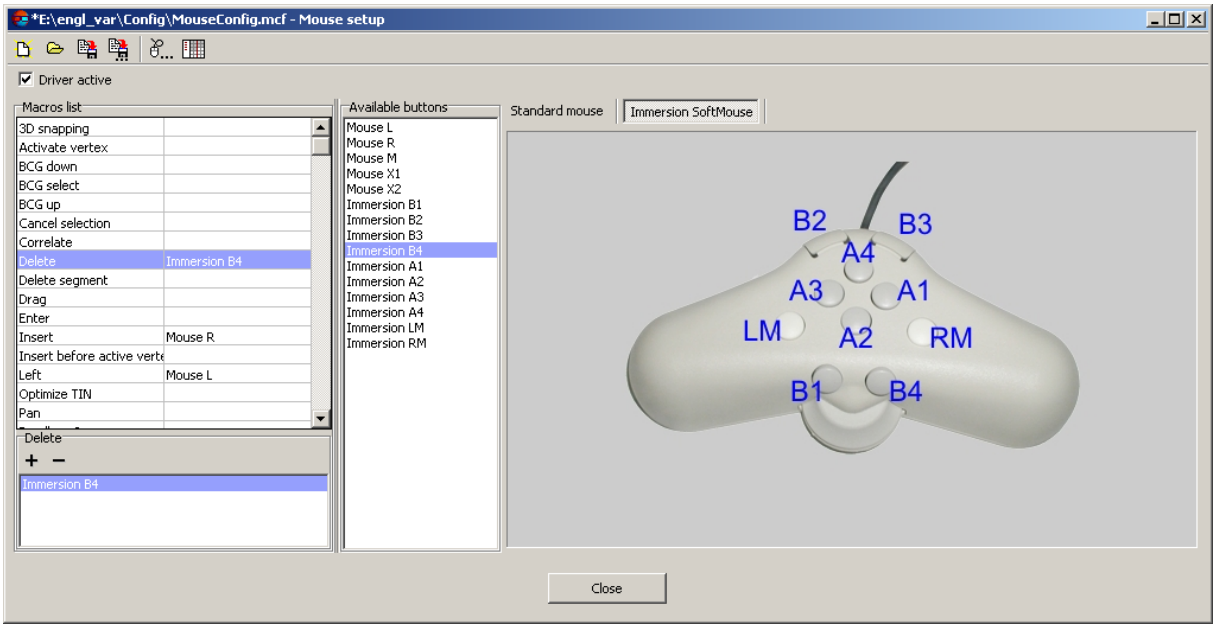
Then return to **Mouse setup** window and assign new or existing macro to necessary button or button combination, by selecting it in **Available buttons** list (choose button combination by mouse with pressed **Ctrl** or **Shift** keys), see the chapter Three and five button mice.



Immersion SoftMouse buttons setup

To assign new macro to chosen mouse button, select the action in **Macros list**, then select mouse button in the **Available buttons** list, and assign the action to the button by pushing the icon **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon **Delete binding**.

When all necessary actions are assigned to the mouse buttons, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

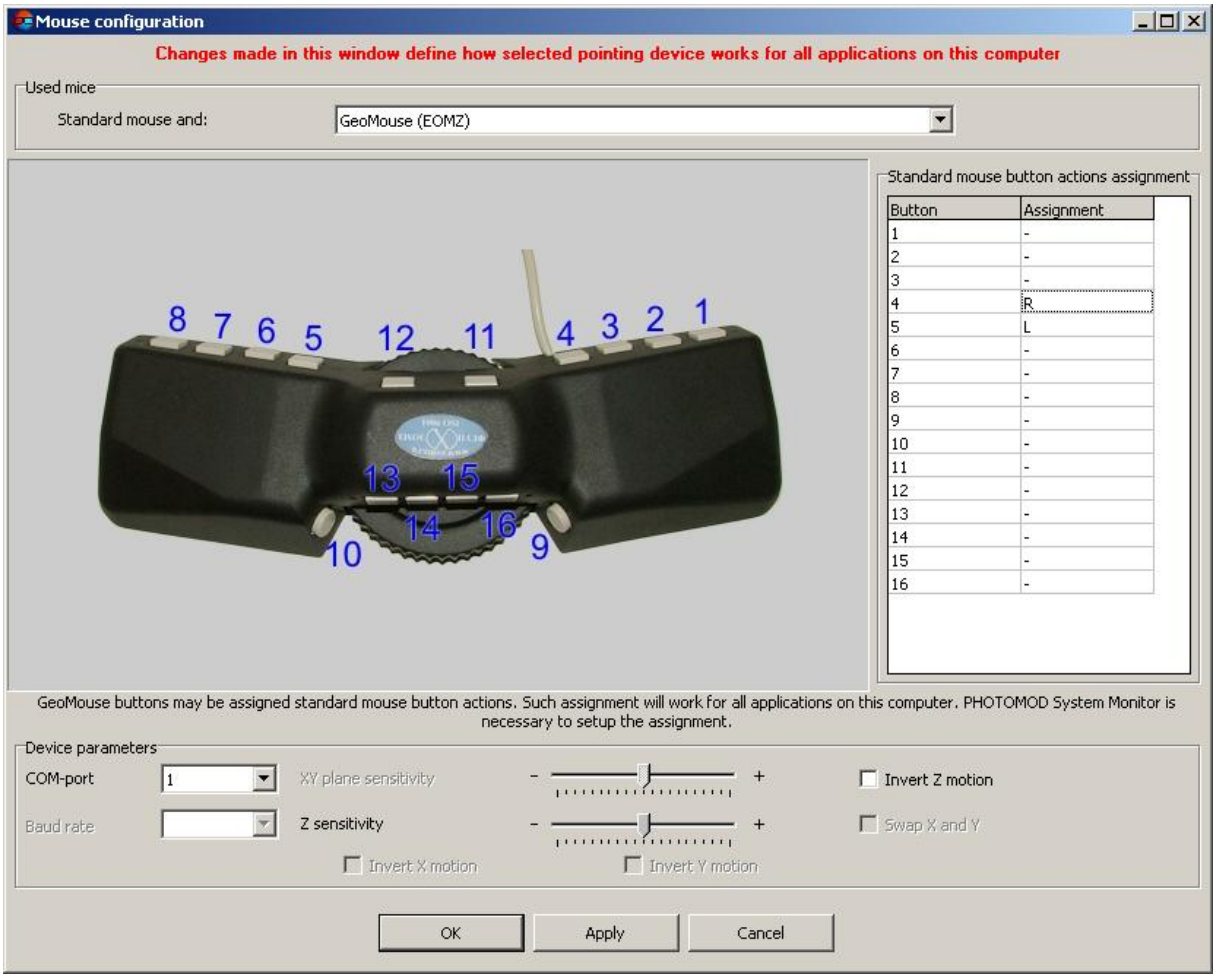
14.2.3 GeoMouse

Photogrammetric 3D manipulator ***GeoMouse*** is used for moving and precise positioning of measuring marker in X,Y,Z-axes and quick launching of frequently using functions while digital photogrammetric processing of images stereopairs.

Note. Turn off your PC prior to GeoMouse plug in

Insert mouse's USB connector into PS/2 port using special adapter. Then insert RS-232 connector into one of PC com-ports and turn PC on. Manipulator has 16 functional buttons and any three of them could be programmed as standard mouse buttons. You can use the manipulator simultaneously with the standard mouse.

After installation of GeoMouse to your PC, turn PC on and run **PHOTOMOD System Monitor** module. Then open the window with mouse settings (menu command **Service | Mouse setup** in **PHOTOMOD Core** module), push the **Device setup** button and select **GeoMouse** in **Used mice** field, see the chapter Mice and hand wheels adjustment for stereo processing.


Mouse configuration
Changes made in this window define how selected pointing device works for all applications on this computer
Used mice
Standard mouse and:
GeoMouse (EOMZ)
Standard mouse button actions assignment
Button
Assignment
8 7 6 5 12 11 4 3 2 1
13 15
14 16
10 9
GeoMouse buttons may be assigned standard mouse button actions. Such assignment will work for all applications on this computer. PHOTOMOD System Monitor is necessary to setup the assignment.
Device parameters
COM-port
Baud rate
XY plane sensitivity
Z sensitivity
Invert Z motion
Swap X and Y
Invert X motion
Invert Y motion
OK
Apply
Cancel

GeoMouse setup in **Mouse configuration** window

Then in **Device parameters** panel select its COM-port, and adjust mouse wheel sensitivity by Z, using an appropriate slider.

Use **Standard mouse button actions assignment** panel to the right to assign actions of the standard mouse buttons to the **GeoMouse**. Select the **GeoMouse** button in **Button** column (button names and their location are shown on leftward picture), and in appropriate cell of **Assignment** column select necessary button of usual mouse by double click in the following way. The first double click will assign left button click (symbol **L** will be shown in the **Assignment** cell), the next double click will assign left button click (symbol **R** will be shown in the **Assignment** cell), the next one – middle button click (symbol **M**).

Such assignment as well as marker move by **GeoMouse** will be valid for all applications on your PC, while **PHOTOMOD System Monitor** is running.

After that push **Apply** and **OK** and open **Macro editor** in **Mouse setup** window, if you need to create new macro, see the chapter Macro editor.
Then return to **Mouse setup** window and assign new or existing macro to necessary button or button combination, by selecting it in **Available buttons** list (choose button combination by mouse with pressed **Ctrl** or **Shift** keys), see the chapter Three and five button mice.

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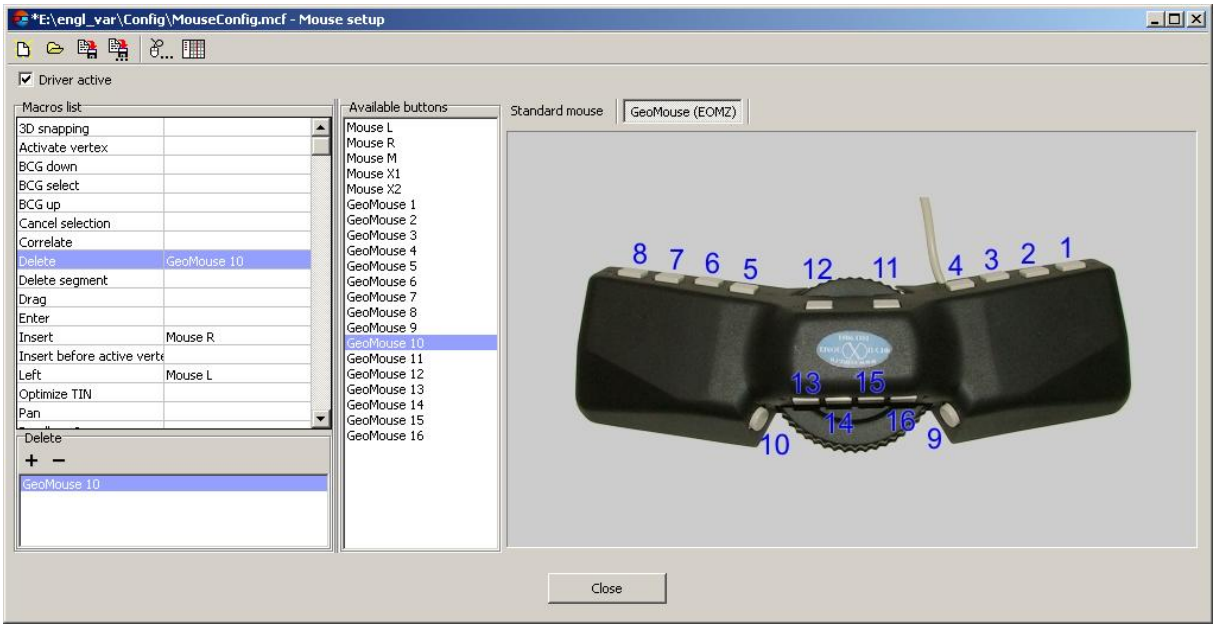


GeoMouse buttons setup

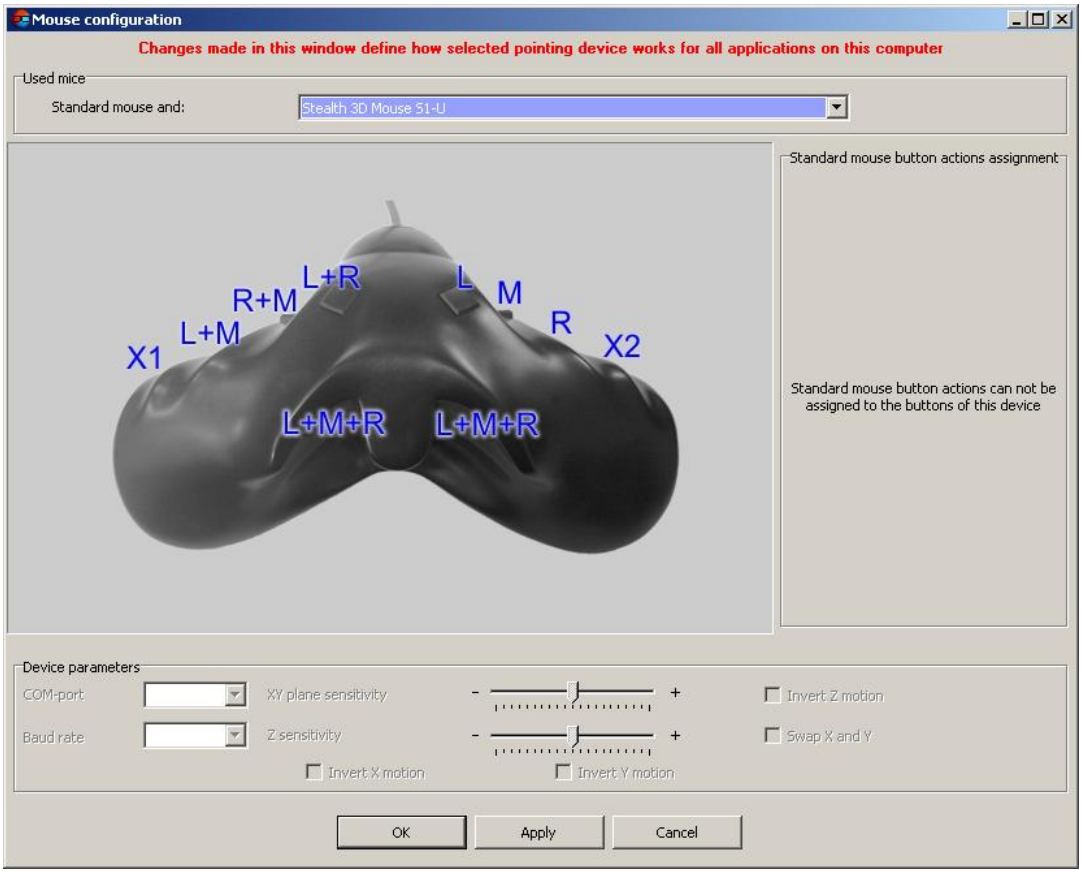
To assign new macro to chosen mouse button, select the action in **Macros list**, then select mouse button in the **Available buttons** list, and assign the action to the button by pushing the icon **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon **Delete binding**.

When all necessary actions are assigned to the mouse buttons, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

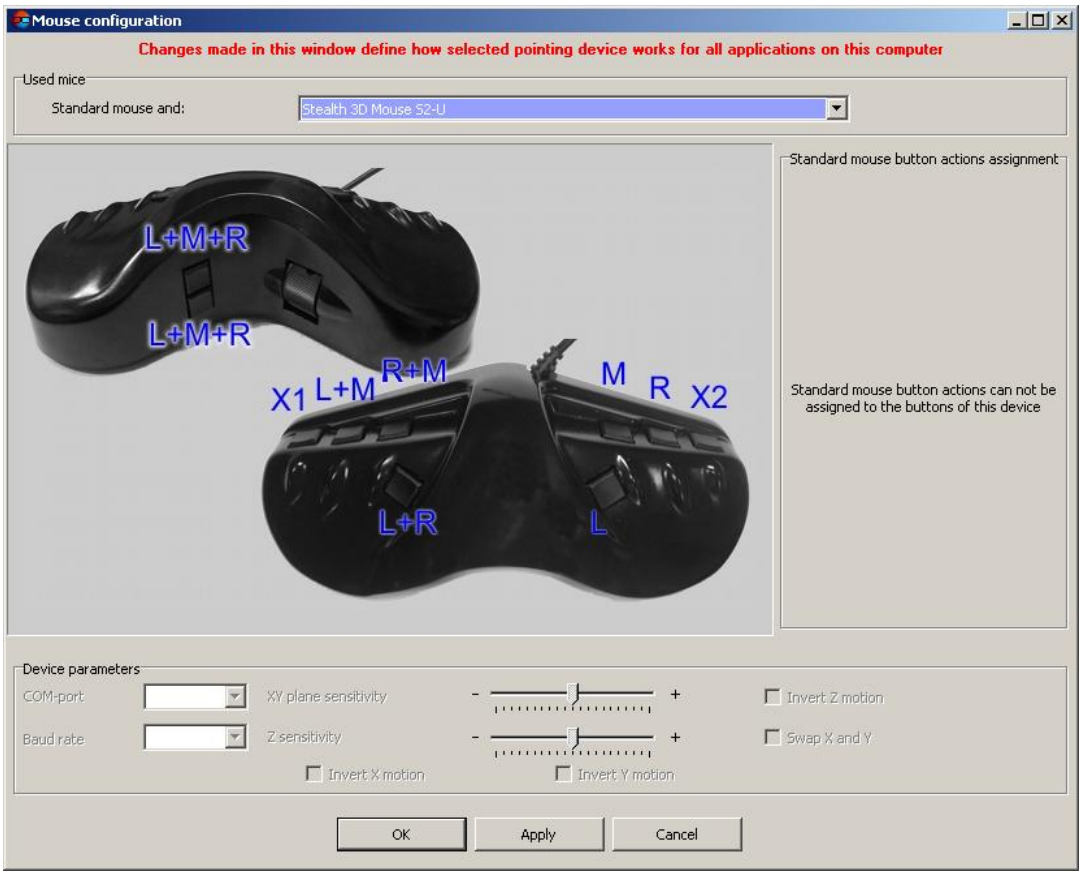
14.2.4 Stealth 3D Mice

14.2.4.1 Stealth 3D Mouse-U

After installation of Stealth 3D Mouse-U (produced by ABS software developers company, http://www.gcs-abc.com) to USB port of your PC, turn PC on and run **PHOTOMOD System Monitor** module. Then open the window with mouse settings (menu command **Service | Mouse setup** in **PHOTOMOD Core** module), push the **Device setup** button and select **Stealth 3D Mouse U** in **Used mice** field, see the chapter Mice and hand wheels adjustment for stereo processing.



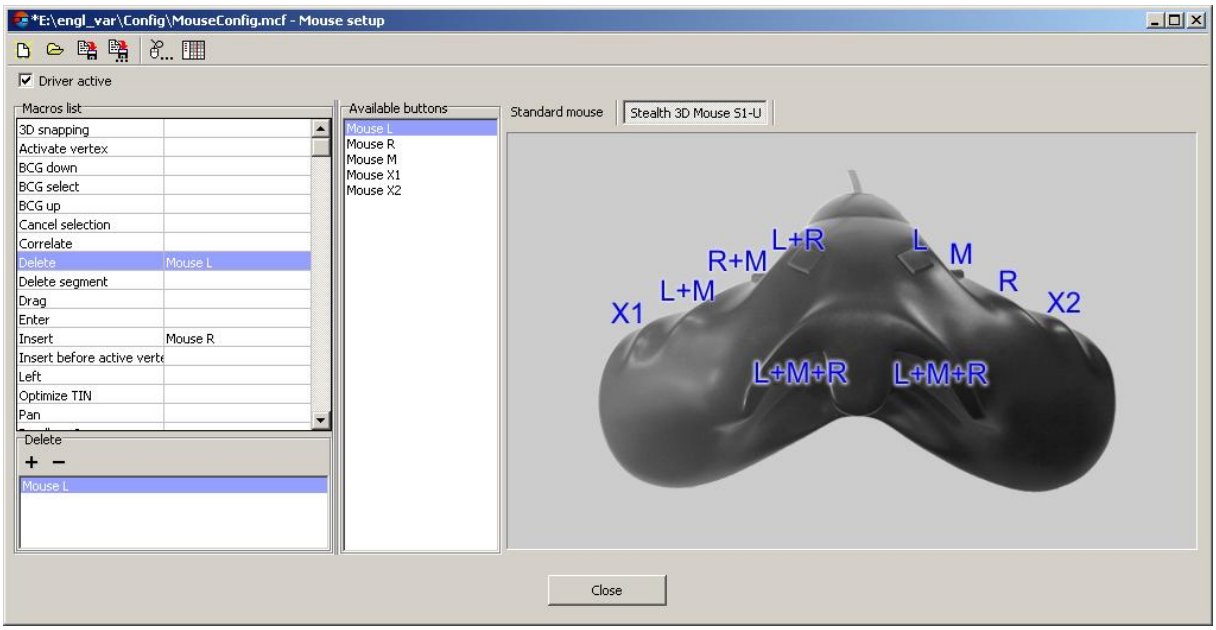
Stealth 3D Mouse S1-U setup in **Mouse configuration** window



Stealth 3D Mouse S2-U setup in **Mouse configuration** window

After that push **Apply** and **OK** buttons and open **Macro editor** in **Mouse setup** window, if you need to create new macro, see the chapter Macro editor.

Then return to **Mouse setup** window and assign new or existing macro to necessary button or button combination, by selecting it in **Available buttons** list (choose button combination by mouse along with pressed **Ctrl** or **Shift** keys), see the chapter Three and five button mice.



Stealth 3D Mouse S1-U buttons setup

To assign new macro to chosen mouse button, select the action in **Macros list**, then select mouse button in the **Available buttons** list, and assign the action to the button by pushing the icon + **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon − **Delete binding**.

Note. Standard mouse button actions can not be assigned to the buttons of Stealth 3D Mouse U

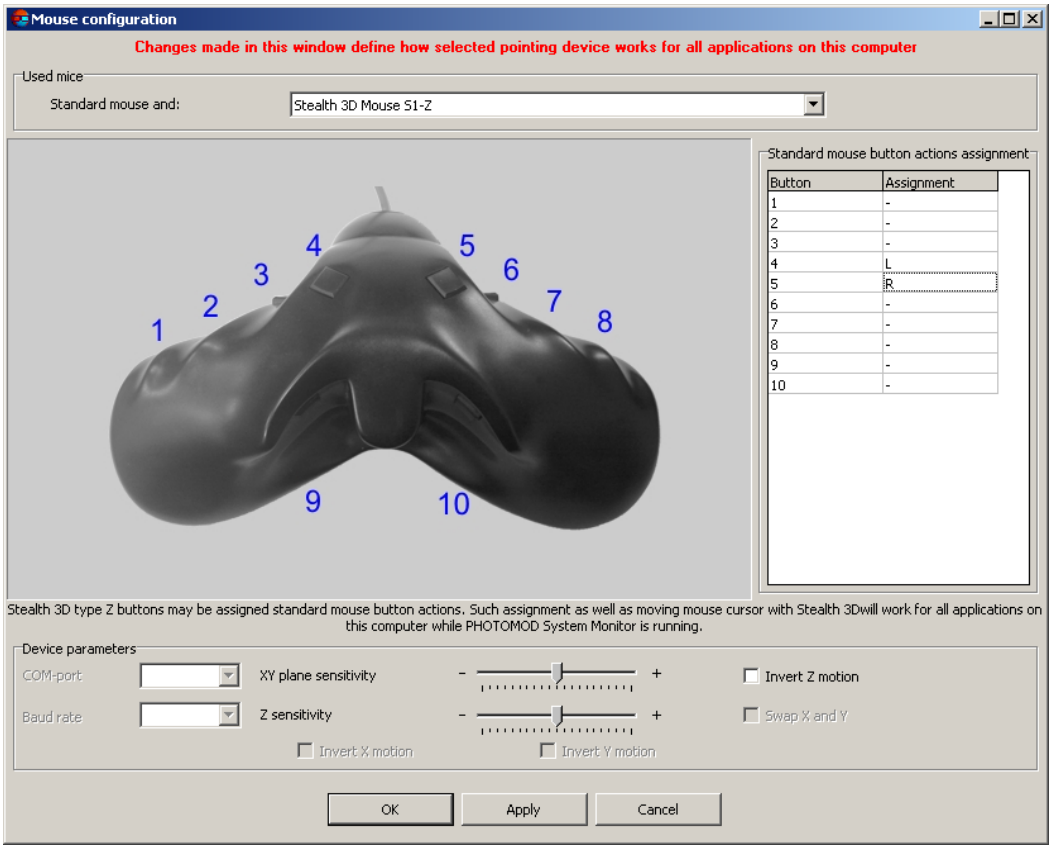
When all necessary actions are assigned to the mouse buttons, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

14.2.4.2 Stealth 3D Mouse-Z

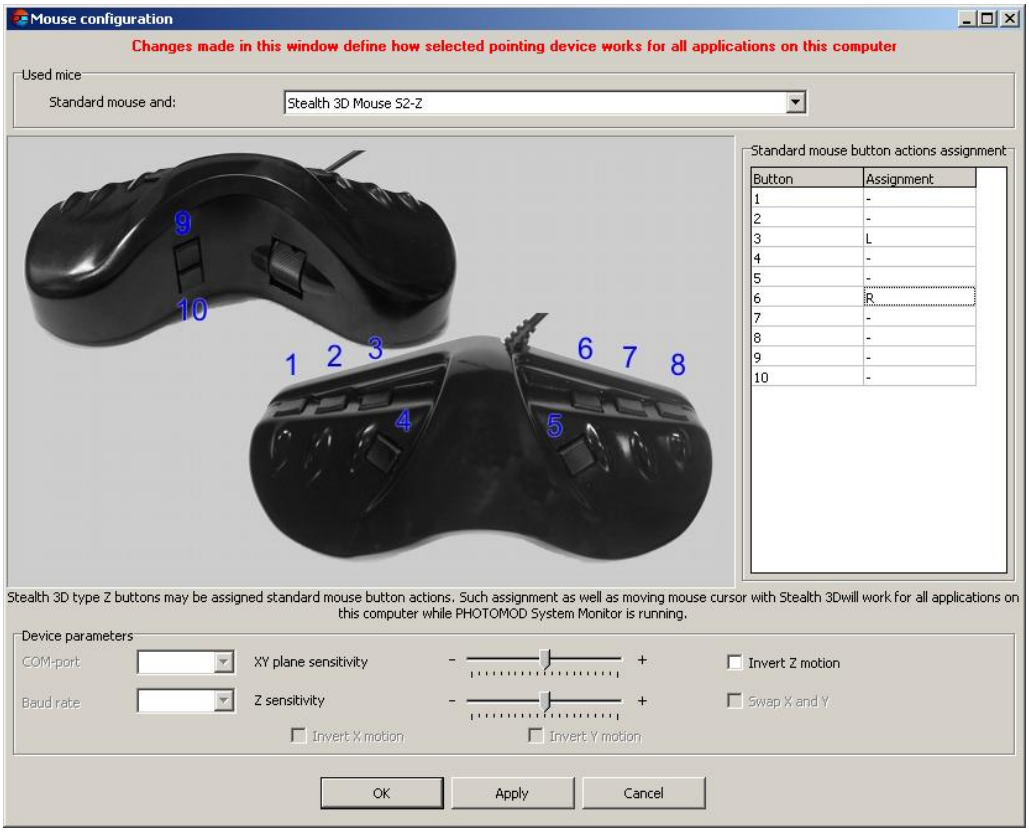
After installation of Stealth 3D Mouse-Z (produced by ABS software developers company, http://www.gcs-abc.com) to USB port of your PC, turn PC on and run **PHOTOMOD System Monitor** module.

Note. After connecting of Stealth 3D Mouse-Z to PC through USB port, start mouse driver, using standard OS Windows operations

Then open the window with mouse settings (menu command **Service | Mouse setup** in **PHOTOMOD Core** module), push the **Device setup** button and select **Stealth 3D Mouse Z** (**S1-Z** or **S2-Z**) in **Used mice** field, see the chapter Mice and hand wheels adjustment for stereo processing.



Stealth 3D Mouse S1-Z setup in **Mouse configuration** window



Stealth 3D Mouse S2-Z setup in **Mouse configuration** window

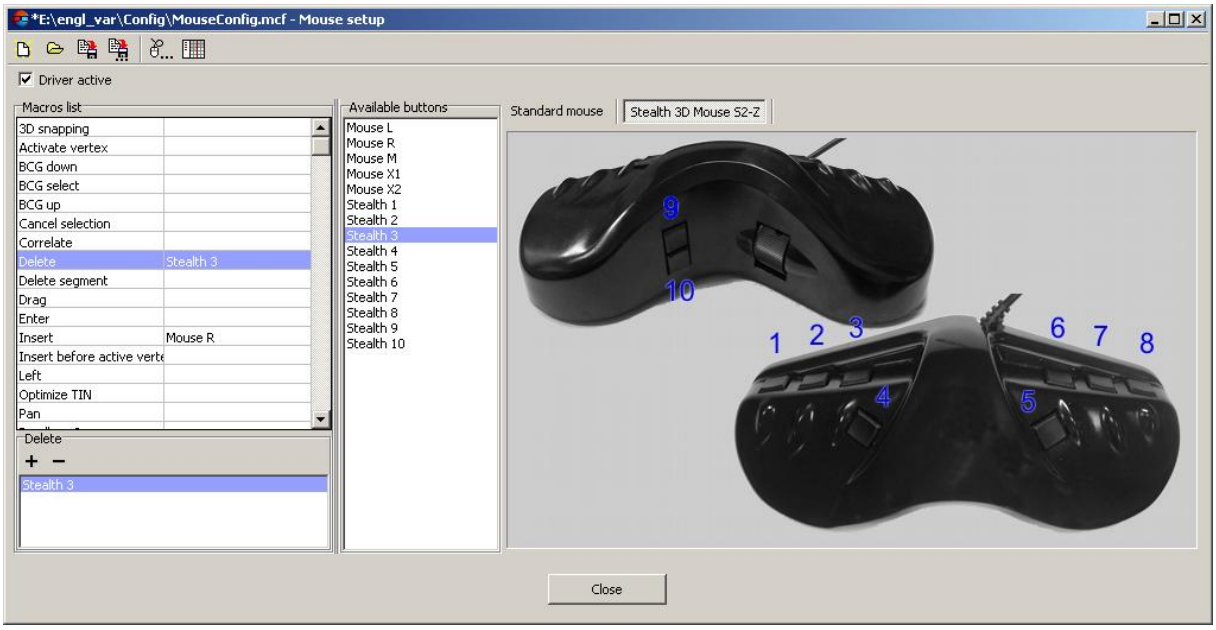
Use **Standard mouse button actions assignment** panel to the right to assign actions of the standard mouse buttons to the **Stealth 3D Mouse-Z**. Select the **Stealth 3D Mouse-Z** button in **Button** column (button names and their location are shown on leftward picture), and in the appropriate cell of **Assignment** column select necessary button of usual mouse by double

click in the following way. The first double click will assign left button click (symbol **L** will be shown in the **Assignment** cell), the next double click will assign left button click (symbol **R** will be shown in the **Assignment** cell), the next one – middle button click (symbol **M**).

Such marker move assigned to **Stealth 3D Mouse-Z** will be valid for all applications on your PC, while **PHOTOMOD System Monitor** is running.

After that push **Apply** and **OK** buttons and open **Macro editor** in **Mouse setup** window, if you need to create new macro, see the chapter Macro editor.

Then return to **Mouse setup** window and assign new or existing macro to necessary button or button combination, by selecting it in **Available buttons** list (choose button combination by mouse with pressed **Ctrl** or **Shift** keys), see the chapter Three and five button mice.



Stealth 3D Mouse **S2-Z** buttons setup

To assign new macro to chosen mouse button, select the action in **Macros list**, then select mouse button in the **Available buttons** list, and assign the action to the button by pushing the icon **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon **Delete binding**.

Note. Standard mouse button actions can not be assigned to the buttons of Stealth 3D Mouse

When all necessary actions are assigned to the mouse buttons, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

14.2.5 Hand wheels and foot pedals

14.2.5.1 Immersion compatible hand wheels and foot pedals

Hand wheels and foot pedals (produced by GeoSystem Company, Ukraine, www.vingeo.com) are used for 3D photogrammetric images processing in **PHOTOMOD** system.

Equipment delivery set includes right and left hand wheels (to perform marker move in plane), foot wheel (to move marker in height) and three pedals (which are assigned to mouse buttons actions, selected by user). These devices are connected to the PC via **Immersion Interface box** (see hardware installation details in equipment User Manual).

After device's installation to your PC, turn PC on and run **PHOTOMOD System Monitor** module. Then open the window with mouse settings (menu command **Service | Mouse setup** in **PHOTOMOD Core** module), push the **Device setup** button and select **Immersion compatible hand wheels/foot pedals** in **Used mice** field, see the chapter Mice and hand wheels adjustment for stereo processing.

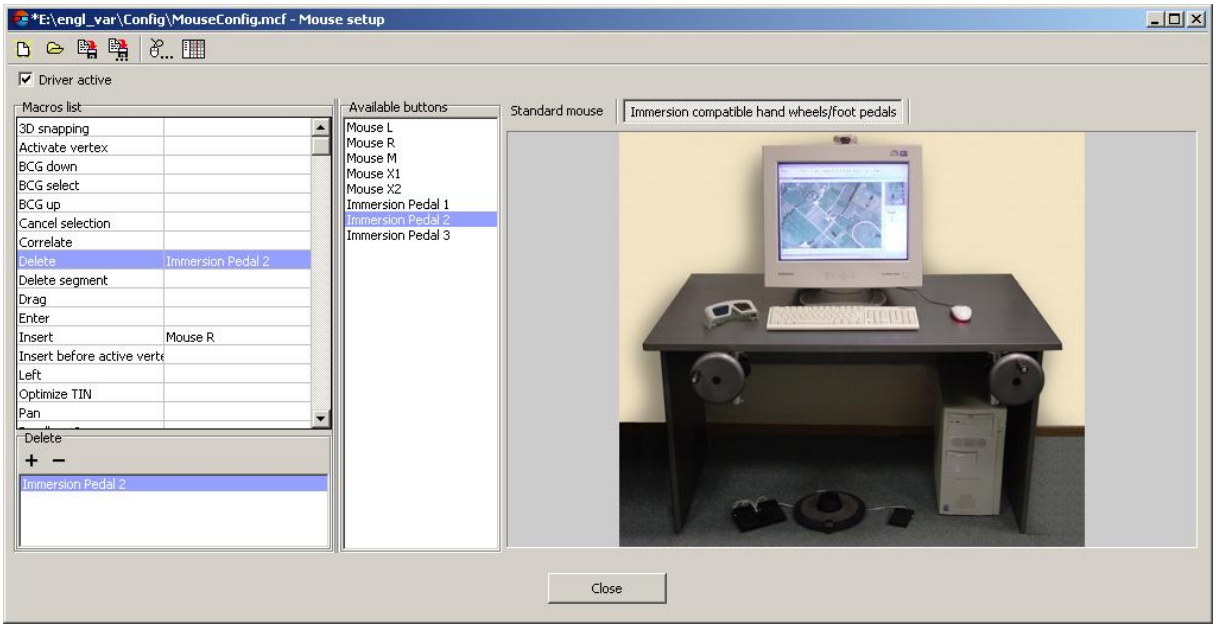
Then in **Device parameters** panel select its COM-port and baud rate. You can adjust hand wheels sensitivity in XY axes using **XY plane sensitivity** slider, and also foot wheel movement sensitivity, which operates marker in Z axis (using **Z sensitivity** slider).

If you need to re-assign X and Y axes to left and right hand wheels, check the option **Swap X and Y**. And if you need to invert movement of marker by right, left or foot wheels, check an appropriate option **Invert X**, **Y** or **Z motion**.

Mouse configuration
Changes made in this window define how selected pointing device works for all applications on this computer
Used mice
Standard mouse and:
Immersion compatible hand wheels/foot pedals
Standard mouse button actions assignment
Standard mouse button actions can not be assigned to the buttons of this device
Moving mouse cursor with the wheels will work for all applications on this computer while PHOTOMOD System Monitor is running.
Device parameters
COM-port
1
XY plane sensitivity
Invert Z motion
Baud rate
115200
Z sensitivity
Swap X and Y
Invert X motion
Invert Y motion
OK
Apply
Cancel

Immersion compatible devices adjustment in **Mouse configuration** window

After that push **Apply** and **OK** buttons and the following picture appears in **Mouse setup** window.



Setup of Immersion compatible foot pedals

This window contains list of macro's existing in default driver or created/edited by the user in **Macro editor**, see the chapter Macro editor.

The rightmost window consists of two tabs, one of which allows to setup standard mouse buttons (see the chapter Three and five button mice), and the second one (**Immersion compatible hand wheels/foot pedals**) – marker's actions after pressing each of three pedals.

To assign new macro or existing to chosen pedal, select the action in **Macros list**, then select pedal in the **Available buttons** list, and assign the action to the pedal by pushing the icon **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon **Delete binding**.

When all necessary actions are assigned to the pedals, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

You can also create new action if necessary and save it into macro in **Macro editor** window, which is opened by the button in the **Mouse setup** window, see the chapter Macro editor.

14.2.5.2 Hand wheels and foot pedals "Vector-A"

Hand wheels and foot pedals "Vector-A" (produced by EOMZ, Moscow) are used for 3D photogrammetric images processing in **PHOTOMOD** system.

Equipment delivery set includes right and left hand wheels (to perform marker move in plane), foot wheel (to move marker in height) and three pedals (which are assigned to mouse buttons actions, selected by user). These devices are connected to the PC via special card inserted into COM-port (see hardware installation details in equipment User Manual).

After device's installation to your PC, turn PC on and run **PHOTOMOD System Monitor** module. Then open the window with mouse settings (menu command **Service | Mouse setup** in **PHOTOMOD Core** module), push the **Device setup** button and select **Hand wheels/foot pedals "Vector-A"** in **Used mice** field, see the chapter Mice and hand wheels adjustment for stereo processing.

Then in **Device parameters** panel select COM-port used for this equipment. You can adjust hand wheels sensitivity in XY axes using **XY plane sensitivity** slider, and also foot wheel movement sensitivity, which operates marker in Z axis (using **Z sensitivity** slider).

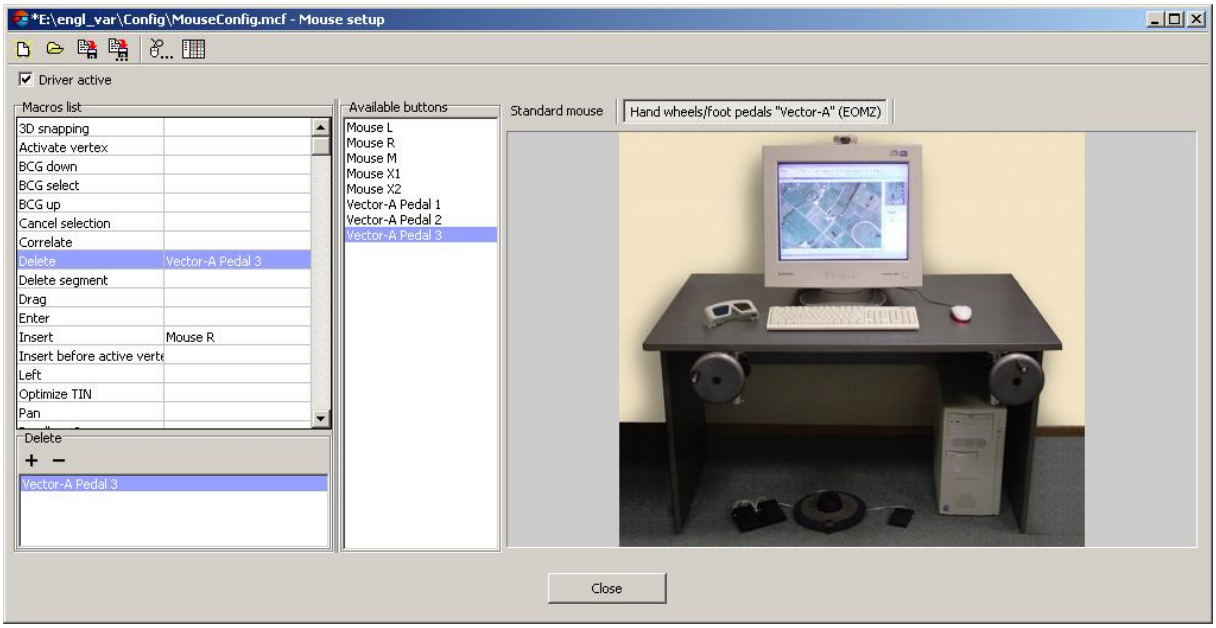
If you need to re-assign X and Y axes to left and right hand wheels, check the option **Swap X and Y**.

And if you need to invert movement of marker by right, left or foot wheels, check an appropriate option **Invert X**, **Y** or **Z motion**.

Mouse configuration
Changes made in this window define how selected pointing device works for all applications on this computer
Used mice
Standard mouse and:
Hand wheels/foot pedals "Vector-A" (EOMZ)
Standard mouse button actions assignment
Standard mouse button actions can not be assigned to the buttons of this device
Moving mouse cursor with the wheels will work for all applications on this computer while PHOTOMOD System Monitor is running.
Device parameters
COM-port
1
Baud rate
XY plane sensitivity
Z sensitivity
Invert Z motion
Swap X and Y
Invert X motion
Invert Y motion
OK
Apply
Cancel

"Vector-A" devices adjustment in **Mouse configuration** window

After that push **Apply** and **OK** buttons and the following picture appears in **Mouse setup** window.



Setup of foot pedals “Vector-A”

This window contains list of macro’s existing in default driver or created/edited by the user in **Macro editor**, see the chapter Macro editor.

The rightmost window contains of two tabs, one of which allows to setup standard mouse buttons (see the chapter Three and five button mice), and on the second one (**Hand wheels/foot pedals “Vector-A”**) – marker’s actions after pressing each of three pedals.

To assign new macro or existing to chosen pedal, select the action in **Macros list**, then select pedal in the **Available buttons** list, and assign the action to the pedal by pushing the icon + **Add binding** (or by double mouse click). If you need to cancel the assignment, push the icon − **Delete binding**.

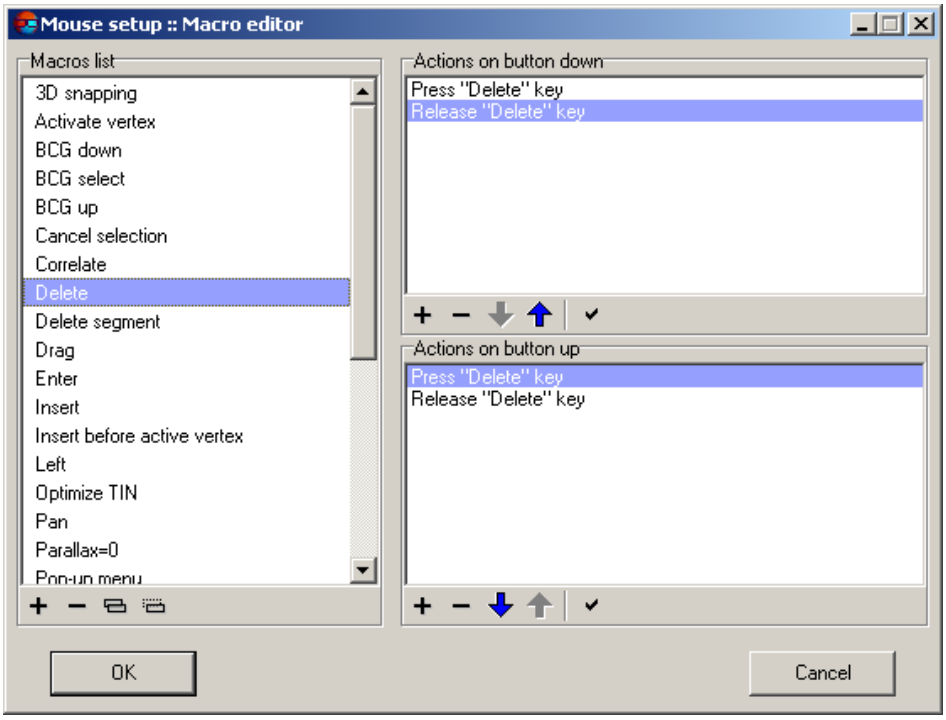
When all necessary actions are assigned to the pedals, you can save this actions configuration to the default driver (by the button **Save**) or to the new one (by the button **Save as**).

You can also create new action if necessary and save it into macro in **Macro editor** window, which is opened by the button in the **Mouse setup** window, see the chapter Macro editor.

14.2.6 Macro editor

PHOTOMOD system includes the set of macro commands for mouse, which could be edited up to user needs and then assign the commands for chosen mouse buttons or foot pedals, if such special photogrammetric equipment is used for images stereo processing.

To open the window with macro list, push the button in the **Mouse setup** window (see the chapter Mice and hand wheels adjustment for stereo processing), after that **Macro editor** window appears. In the left part of the window there is a list of macro commands that are included into mouse driver by default.

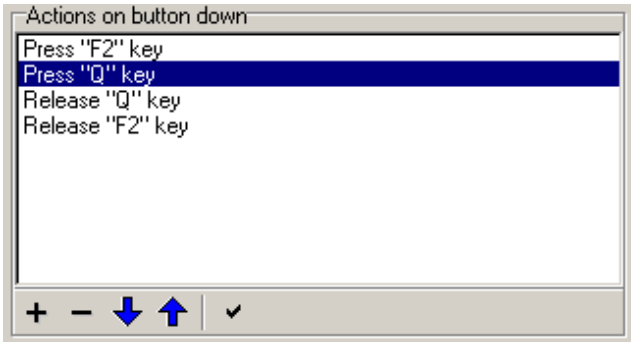


Macro editor window

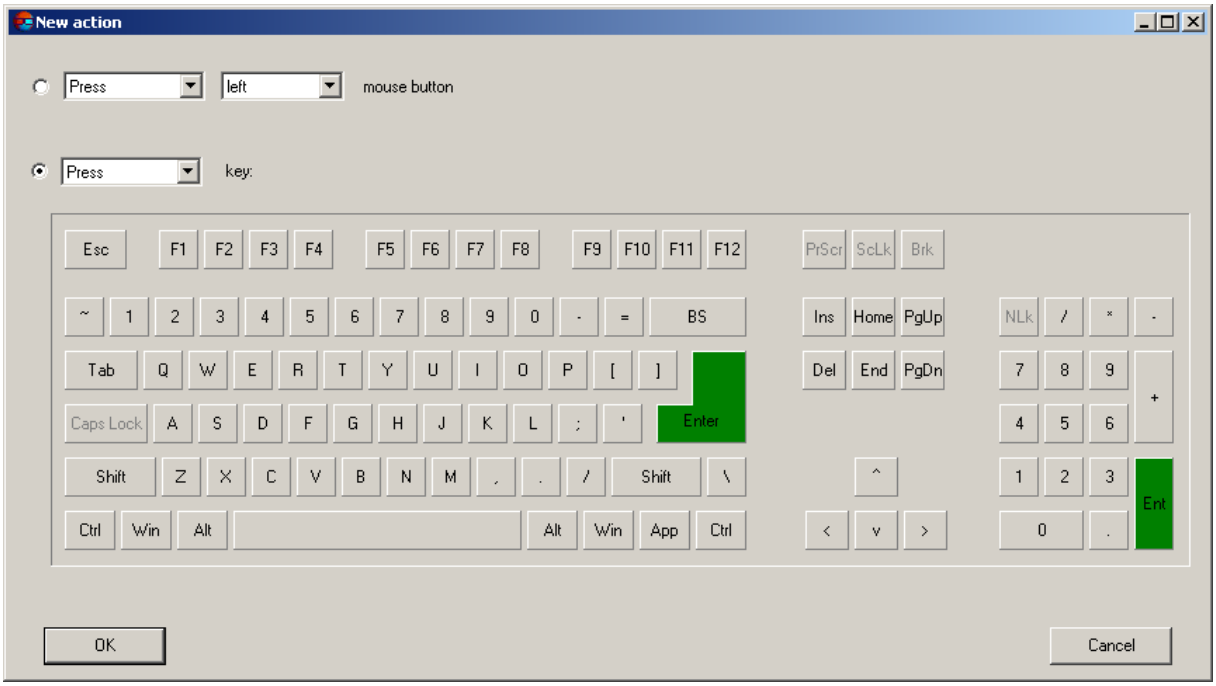
Under the list of standard macro there are following buttons:

- - add macro – opens a field to input new macro name. After name input and pushing **OK** adds new macro in the list
- - delete macro – deletes macro from the list
- - copy macro – creates new macro in the list as a copy of selected one
- - rename macro – allows to rename macro name in opened field

To create new macro push the button, input new macro name, then select this macro in the left list of **Macro editor** window. To the right of the list there are two windows used for assigning chosen actions to buttons. Upper window (**Actions on button down**) includes operations list, executed when button is pushed down.



To select an action and save it into macro push the button (**add action**) under this window to open the following panel:



Creating new action for macro

Here you can select one of two ways:

- Press selected mouse button – after that you should indicate the exact mouse button (left, right or middle) in pop-down list to be pressed
- Press selected key – press chosen key on the shown keyboard (it will be highlighted in green)

After selecting the set of actions you can save the set (**Cancel** button) or save it (**OK** button), then this action appears in **Actions on button down** window.
The rest buttons under actions list are used for the following:

- - delete action
- - move down
- - move up
- - autocreate sequence for button up – automatically adds and completes the action which was started by mouse pushing. For example, if you need to assign Ctrl-Z keys pressing to mouse button click, you can assign pushing Ctrl and Z keys, and then push icon to add releasing of Ctrl and Z keys and automatically complete the macro, which will be visualized in this window.

In the same way you can include to macro command in **Actions on button up** window the actions which are executed after releasing of chosen mouse button.

When all necessary actions are included into selected macro, save them by pushing **OK**.

15. Distributed processing

15.1 Overview

PHOTOMOD includes distributed processing system, i.e. capability of parallel task execution with multiple processor cores or multiple computers in local network. This helps achieve maximum utilization of hardware resources for carrying out large projects.

Task types

Distributed processing is supported for the following types of tasks:

- Transformation of images with **PHOTOMOD Raster Converter** (see chapter PHOTOMOD Raster Converter).
- Preparation of ADS data (see **Project creation** User Manual).
- Automatic measurement of tie points (see **Aerial triangulation** User manual).
- Calculation of pickets (DTM) (see **Project processing** User Manual).
- Creation of orthophoto in **Mosaic** module (see **Orthomosaic building** User Manual).

Computer roles

Computers participating in the distributed processing are assigned one or more of the following roles:

- **Server** is the control center of the distributed processing, responsible for distribution of tasks and synchronization of client computers
- **Client** a "worker", which receives tasks to process from the Server. Each Client must be connected to the Server.
- **Monitor** an "observer", which allows an operator to control tasks execution process. The Monitor must be connected to the Server.

Server may also act as a Client or Monitor. Clients can be temporarily excluded from processing.
Also it is possible to employ all benefits of distributed processing on a single computer, i.e. having multi-core CPU (in this case, the computer acts as the Server, Client and Monitor at the same time).

There may be set up several groups of computers within one local network, processing projects independently of each other.

Any Client or Server may be used to post tasks, and only Server may be used to synchronize processing.

Prerequisites for processing tasks in distributed processing mode

Network distributed processing

Network distributed processing requires allocation of multiple networking computers as Clients for tasks performing. In order to organize network distributed processing you need to *connect* network profile to all participants, i.e. the same **Centralized management folder** must be set on all computers (see chapter Creating and connecting network profiles). At that it is not necessary to choose the same profile as active on computers-Clients, i.e. while performing tasks in distributed processing mode you may work in the system using any active profile, including local. All physical input/output folders should have read/write access for all and you should specify full path to them.

Local distributed processing

Local distributed processing requires allocation of single multicore computer to perform tasks. In this case the computer is used as Server-Client-Monitor at the same time. All physical input/output folders including network folders should have read/write access. For local folders it is not necessary to specify full path.

15.2 Mode initial setup

Perform the following actions for initial setup of distributed processing mode:

I. Define membership of network computers and their roles. In case of network distributed processing you should choose Server-computer for tasks management and specify Client-computers for tasks processing. In case of local distributed processing you should define a single multicore computer, which will be used as a Server–Client–Monitor.

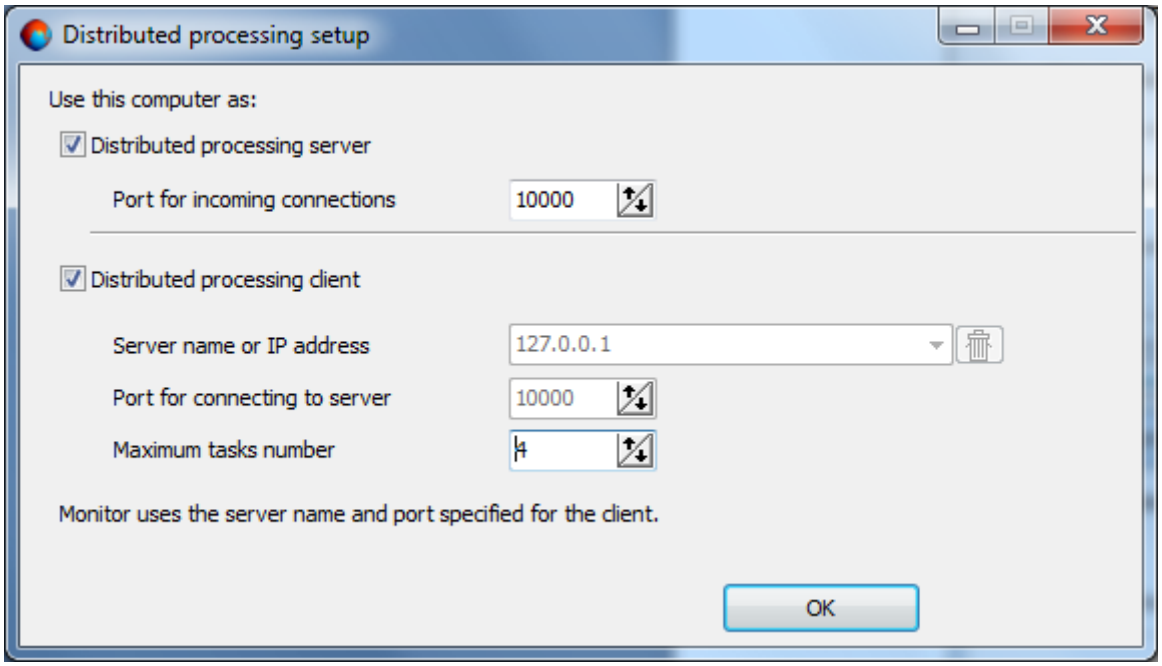
Warning: To perform network distributed processing you should setup the same folder of centralized management of network profiles on all computers involved to the process (see chapter Creating and connecting network profiles).

II. Specify synchronization folder in advance – target folder used to store files of tasks and processing results. Synchronization folder should be specified further when posting tasks for processing.

III. Setup Server-computer as follows:

1. Right click the icon PHOTOMOD System Monitor in Windows system tray. Choose **Distributed processing control center** in context menu. The icon of distributed processing center appears in Windows system tray.

2. Right click the icon. Choose **Settings** in context menu. The **Distributed processing setup** window is opened.



3. Select the **Use this computer as: Distributed processing server** checkbox and define the **Port for incoming connections** (it is specified by default).

4. [optional] Select the **Use this computer as: Distributed processing client** checkbox in following cases:

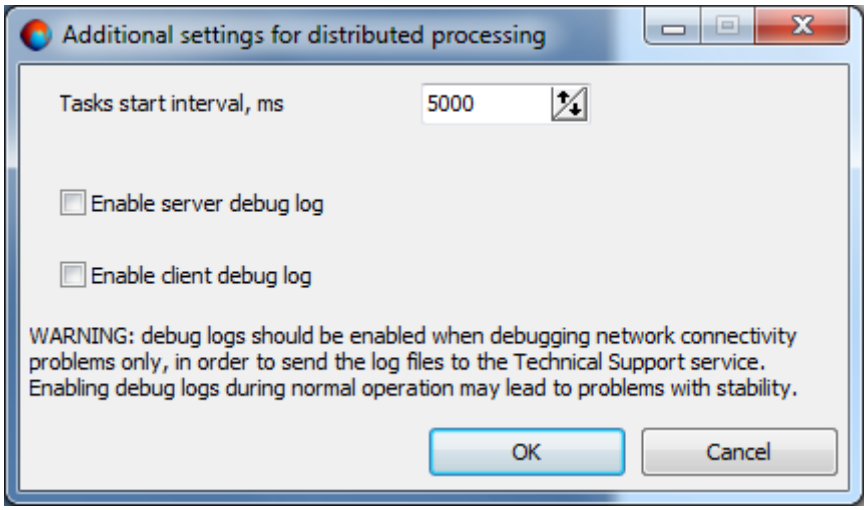
- To organize local distributed processing, when you are going to process tasks using single multicore computer, which is Server-Client-Monitor at the same time;
- In case of network distributed processing when you are going to use the Server not only for management, but for tasks processing (as a Client).

Address and port data of the Server are detected automatically and are used then to establish connection between Clients and Server.

In the **Maximum tasks number** input field specify number of tasks that will be executed by the Client simultaneously. By default the number of tasks equals the number of processors or cores (for multicore processors) in computer.

Note: In general case it is not recommended to increase a number of tasks, specified by default, since it is not result in additional increasing of performance. On the contrary, overall time of tasks execution will increase. If you are going to use the computer for other work along with executing tasks in distributed processing mode, it is recommended to decrease this value.

3. [optional] Click the **More** button. The **Additional settings for distributed processing** window is opened, where you can define tasks start interval in milliseconds and create debugging logs of Client and Server. Click **OK**.


Additional settings for distributed processing
Tasks start interval, ms
5000
Enable server debug log
Enable client debug log
WARNING: debug logs should be enabled when debugging network connectivity problems only, in order to send the log files to the Technical Support service.
Enabling debug logs during normal operation may lead to problems with stability.
OK
Cancel

4. Click **OK** in the **Distributed processing setup** window to finish Server setup. The icon appears in Windows system tray, if only Server is running, or the icon, if Server is Client.
5. Right click the icon of distributed processing. Choose **Start monitor** in the context menu. The **Monitor for distributed processing** window is opened where you can view and manage distributed processing operations. If the Server is defined as a Client, the **Computers** table (that contains clients and monitors) shows Server-computer (as a Client).

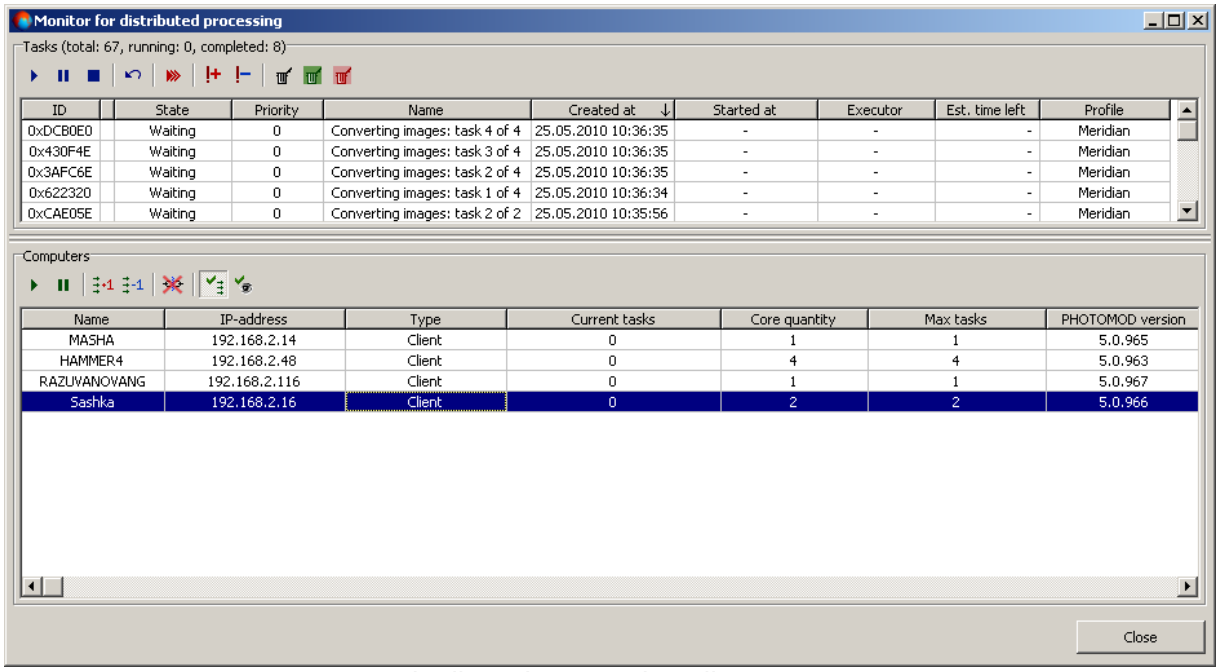
IV. Setup each of Client-computers in the following way (for network distributed processing).

1. Right click the icon PHOTOMOD System Monitor in Windows system tray. Choose the **Distributed processing control center** in context menu. The icon of distributed processing center appears in Windows system tray.

2. Right click the icon. Choose **Settings** in context menu. The **Distributed processing setup** window is opened.

3. Select only the **Distributed processing client** checkbox. Specify address of the Server-computer or choose its name using the ... button, define port used to establish connection with Server, specify maximal number of tasks for processing on the Client-computer. Specify additional parameters of distributed processing if necessary using the **More** button.
4. Click OK in the **Distributed processing setup** window to complete the Client setup. The icon appears in Windows system tray.
5. Right click the icon of distributed processing. Choose **Start monitor** in the context menu. The **Monitor for distributed processing** window is opened. The **Computers** table shows all computers connected to the Server. Click the button to show all connected Clients (it is pressed by default, i.e. the table contains only all running Clients). Use the button to show all connected Monitors (see chapter Computers management).

Note: In order for the performed settings of distributed processing become info effect it is usually required to restart the Distributed processing center.


Monitor for distributed processing
Tasks (total: 67, running: 0, completed: 8)
ID | State | Priority | Name | Created at | Started at | Executor | Est. time left | Profile
0xDCB0E0 | Waiting | 0 | Converting images: task 4 of 4 | 25.05.2010 10:36:35 | - | - | - | Meridian
0x430F4E | Waiting | 0 | Converting images: task 3 of 4 | 25.05.2010 10:36:35 | - | - | - | Meridian
0x3AFC6E | Waiting | 0 | Converting images: task 2 of 4 | 25.05.2010 10:36:35 | - | - | - | Meridian
0x622320 | Waiting | 0 | Converting images: task 1 of 4 | 25.05.2010 10:36:34 | - | - | - | Meridian
0xCAE05E | Waiting | 0 | Converting images: task 2 of 2 | 25.05.2010 10:35:56 | - | - | - | Meridian
Computers
Name | IP-address | Type | Current tasks | Core quantity | Max tasks | PHOTOMOD version
MASHA | 192.168.2.14 | Client | 0 | 1 | 1 | 5.0.965
HAMMER4 | 192.168.2.48 | Client | 0 | 4 | 4 | 5.0.963
RAZUVANOVANG | 192.168.2.116 | Client | 0 | 1 | 1 | 5.0.967
Sashka | 192.168.2.16 | Client | 0 | 2 | 2 | 5.0.966
Close
Distributed processing clients

You can change distributed processing mode configuration at any time: disable completely or temporarily any of Client-computers from participation in distributed processing and/or connect new Client-computer. You can enable/disable the Client in the **Distributed processing setup** window using the **Use this computer as: Distributed processing client** checkbox. You can temporary disable the Client-computer (set it to pause) in the **Monitor for distributed processing** window using the button (see chapter Computers management).

If you would like to view computer status in distributed processing mode, and to check if the Server and/or Client is running and Client and Server are connected, point mouse cursor on the icon of distributed processing in Windows system tray to see the following popup window:

15.3 Distributed processing center

Distributed processing center in launched using one of the following menu items in PHOTOMOD System Monitor context menu (opened by right clicking the icon in Windows system tray):

- **Distributed processing control centre** – is used to start **Distributed processing center** – the appropriate icon appears in Windows system tray, its view depends on the status of computer in distributed processing mode shown as follows:

  – Server and Client are not running, i.e. the computer does not take part in distributed processing;

  – Client is running, but no connection with Server;

  – Only Server is running;

  – Client and Server are running, Client connection with Server is established;

  – Client is running, connection with Server is established.
- **Start automatically**. Allows to start the **Distributed processing control centre** automatically during Windows loading.

Right click on the icon opens the context menu of distributed processing, which contains the following commands:

- **Start monitor** allows to open the **Monitor for distributed processing** window used to view tasks performing process, and to form list of tasks which are planned to be performed on Client-computer, and to manage the process on Server-computer.
- **Settings** allows to open the **Distributed processing setup** window used to specify computer status (Server, Client or Server-Client) in distributed processing mode, and to define additional parameters.
- **About** is used to view information about the **Distributed processing control centre** program (version, serial number, build date and technical support expiry date).
- **Exit** – used to exit from the Distributed processing control centre.

15.4 Tasks posting for distributed processing

To post tasks for distributed processing (see types of such tasks in chapter Overview) it is needed to create tasks in corresponding applications:

- Define the content of task (for example, converting of images, computing of pickets), open the appropriate modules / windows, define the output folders (and also the input folders in case of images conversion) and press the **Distributed processing** button;
- Split the task into part for distributed processing by Clients;
- Define the synchronization folder* (target folder) for task files and processing results storing. Synchronization management folder should be initially empty and available for reading and writing from all computers, which are intended be used in distributed processing. You should specify the synchronization folder during posing tasks for processing. The folder is located in profile resources or in Windows file system, depending on the task type. In case of automatic tie points measurement it is not necessary to define the target folder.

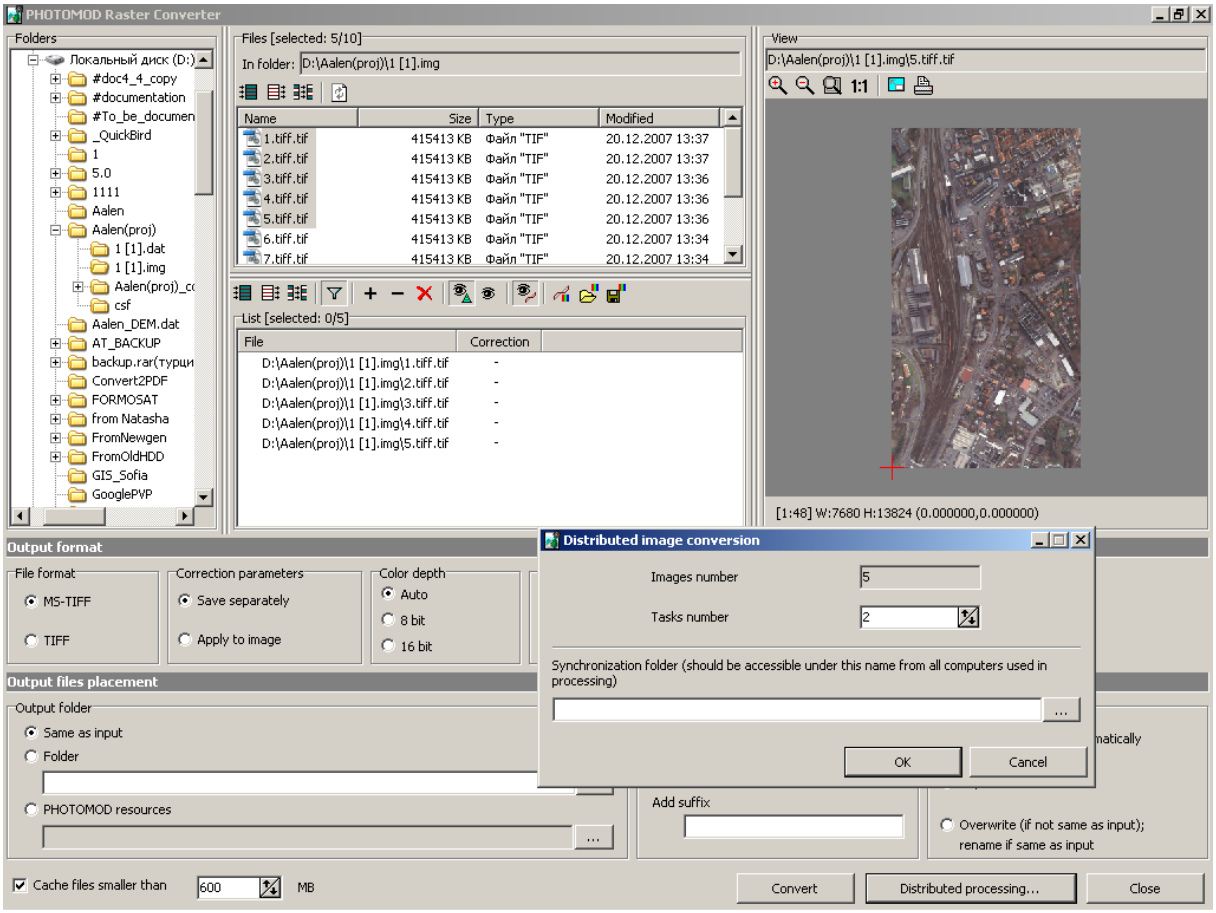
**It is not recommended to edit the tasks files (*.tsk) manually, it can lead to errors during the processing. After the tasks have been completed, they may be deleted by standard Windows means. It is possible to use multiple folders for tasks files storage (for example, for each*

group of tasks), as there is a configuration file, which "collects" the tasks from the folders, forms the common tasks list and monitors the tasks.

Example 1: consider posting of tasks for network distributed processing and PHOTOMOD Raster Converter, i.e. the content of task - converting of images into PHOTOMOD internal format.

1. Source data

Distributed processing is organized with the participation computer of local network.
Tasks will formed by one of the network Clients with Belgium3 active profile.
This profile is connected (not necessarily is active) on all other network Clients.



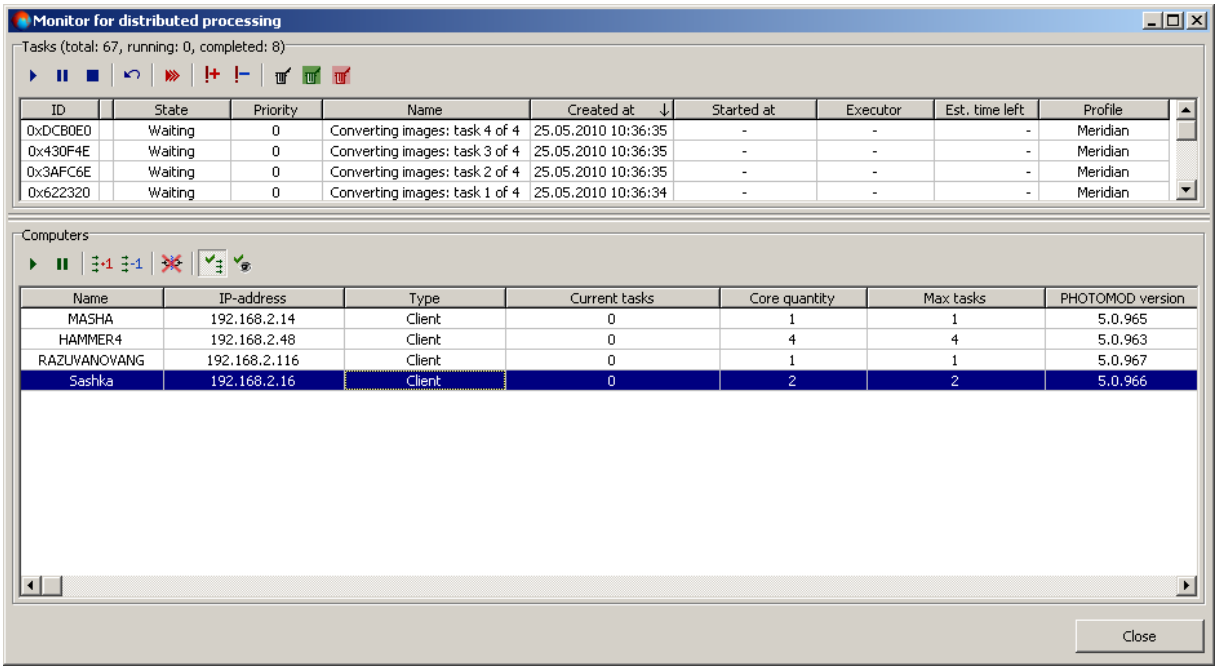
2. Conditions for correct processing

- Input folder * must be networking and available to reading / saving for all Clients. Input folder must be specified as a full UNC name.
- As an output folder can be specified:
  - The network folder available to reading / saving for all Clients (Output folder must be specified as a full UNC name);
  - Resource folder of Client active network profile. This profile should be connected, but not necessarily be active in all other network Clients.**

* For other task types, available for distributed processing mode, is not required to specify the input folder; posting of tasks is performed during the usage of active Client profile, i.e. the resources data of the active profile is used.
** Real output folder can be specified only during the convertion of images and orthophoto building in Mosaic module (see appropriate User manual), otherwise a resource folder of active profile is specified.

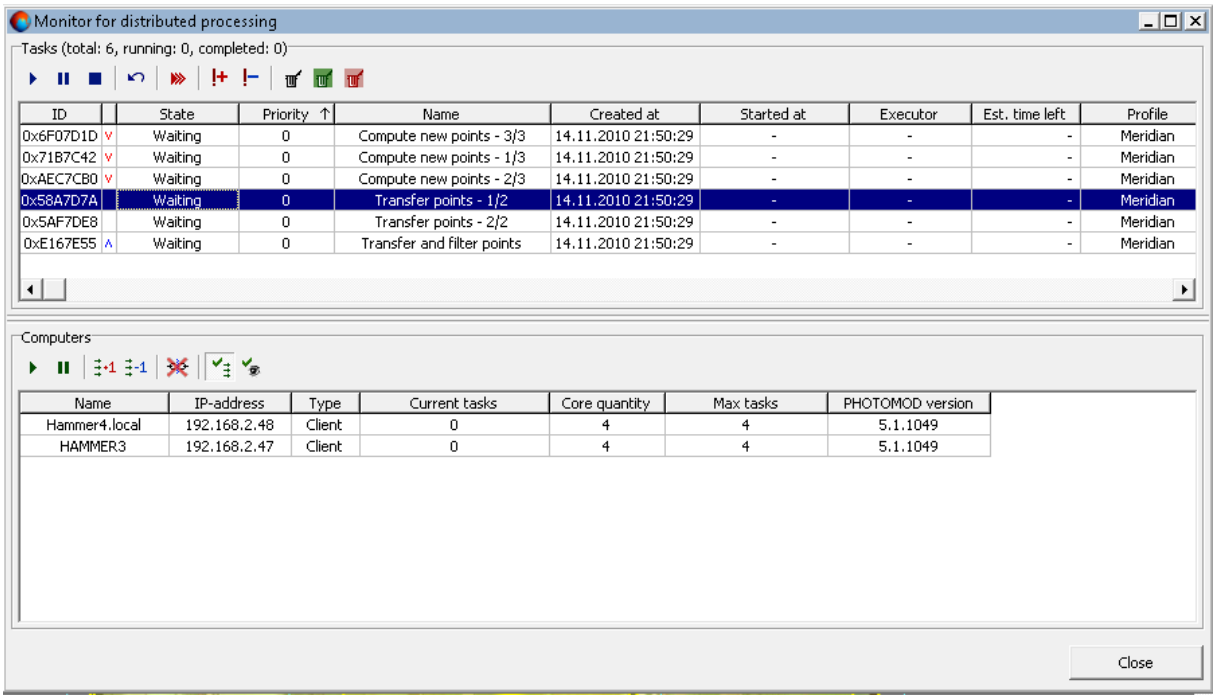
3. Posting of tasks

After selecting the images for conversion and setting converting parameters, press the **Distributed Processing** button. Then the window opens in which should be specified number of tasks to be divided into files for processing. For this rely on a number of images (in the appropriate field) as well as a number of Clients. Also should be specified the network **Synchronization folder** available for reading / saving for create task files (must be specified full path to the folder). Tasks which were posted displays in the **Monitor for distributed processing** window after the **OK** button pushing.


Monitor for distributed processing
Tasks (total: 67, running: 0, completed: 8)
ID State Priority Name Created at Started at Executor Est. time left Profile
0xDCB0E0 Waiting 0 Converting images: task 4 of 4 25.05.2010 10:36:35 - - - Meridian
0x430F4E Waiting 0 Converting images: task 3 of 4 25.05.2010 10:36:35 - - - Meridian
0x3AFC6E Waiting 0 Converting images: task 2 of 4 25.05.2010 10:36:35 - - - Meridian
0x622320 Waiting 0 Converting images: task 1 of 4 25.05.2010 10:36:34 - - - Meridian
Computers
Name IP-address Type Current tasks Core quantity Max tasks PHOTOMOD version
MASHA 192.168.2.14 Client 0 1 1 5.0.965
HAMMER4 192.168.2.48 Client 0 4 4 5.0.963
RAZUVANOVANG 192.168.2.116 Client 0 1 1 5.0.967
Sashka 192.168.2.16 Client 0 2 2 5.0.966
Close

Posting of four tasks for converting of images in the distributed processing mode

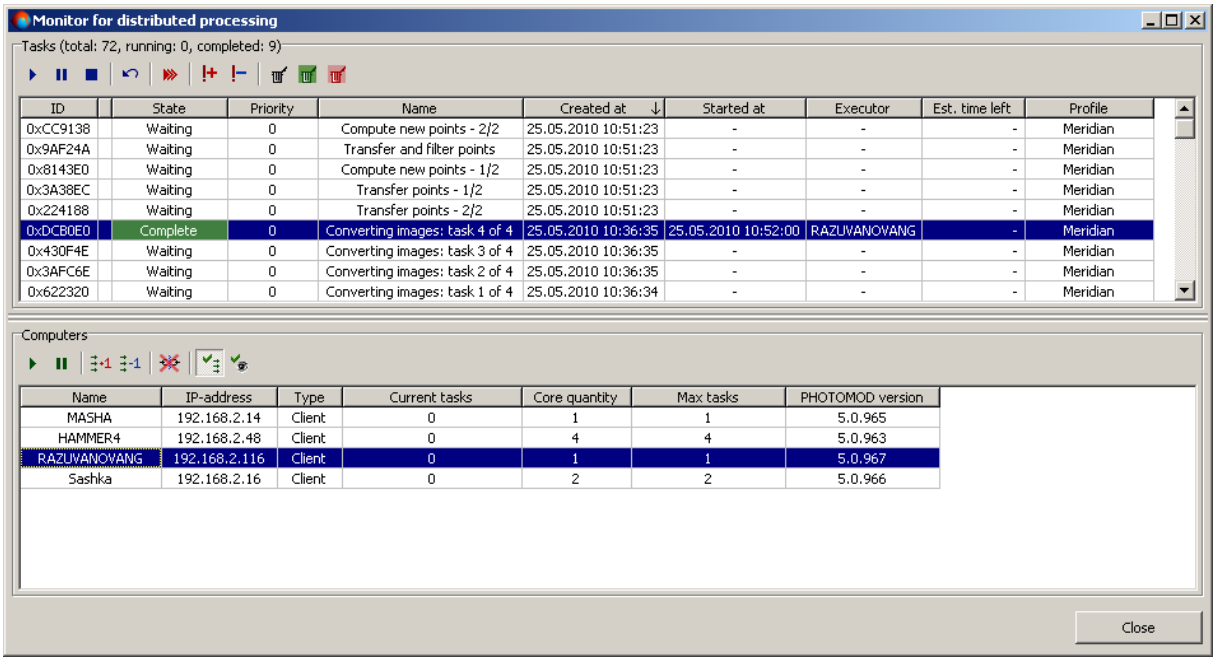
Example 2: Specifics of tasks creation for automatic tie points measurement. After settings all parameters for the process in the **Automatic measurement of tie points** window (see **Aerial Triangulation** User manual), press the **Distributed Processing** button. Specify number of tasks. After the **OK** button is pressed, the created tasks appear in the **Monitor for distributed processing** window.


Monitor for distributed processing
Tasks (total: 6, running: 0, completed: 0)
ID State Priority Name Created at Started at Executor Est. time left Profile
0x6F07D1D Waiting 0 Compute new points - 3/3 14.11.2010 21:50:29 - - - Meridian
0x71B7C42 Waiting 0 Compute new points - 1/3 14.11.2010 21:50:29 - - - Meridian
0xAEC7CB0 Waiting 0 Compute new points - 2/3 14.11.2010 21:50:29 - - - Meridian
0x58A7D7A Waiting 0 Transfer points - 1/2 14.11.2010 21:50:29 - - - Meridian
0x5AF7DE8 Waiting 0 Transfer points - 2/2 14.11.2010 21:50:29 - - - Meridian
0xE167E55 Waiting 0 Transfer and filter points 14.11.2010 21:50:29 - - - Meridian
Computers
Name IP-address Type Current tasks Core quantity Max tasks PHOTOMOD version
Hammer4.local 192.168.2.48 Client 0 4 4 5.1.1049
HAMMER3 192.168.2.47 Client 0 4 4 5.1.1049
Close

Since the procedure of automatic tie point measurement includes successive passing of specified stages (points calculation, rejection and matching), the created tasks are interdependent and are performed in the certain order. The second column (dependencies), in the **Monitor for distributed processing** window, is used to display the dependencies of tasks from each other. A task does not run until all the tasks it depends on are successfully accomplished.

15.5 Control of distributed processing

The **Monitor for distributed processing** window, which is opened by the menu command **Monitor | Start monitor** (in the **Distributed processing control center** menu) is used to control the status of distributed processing.


Monitor for distributed processing
Tasks (total: 72, running: 0, completed: 9)
ID State Priority Name Created at Started at Executor Est. time left Profile
0xCC9138 Waiting 0 Compute new points - 2/2 25.05.2010 10:51:23 - - - Meridian
0x9AF24A Waiting 0 Transfer and filter points 25.05.2010 10:51:23 - - - Meridian
0x8143E0 Waiting 0 Compute new points - 1/2 25.05.2010 10:51:23 - - - Meridian
0x3A38EC Waiting 0 Transfer points - 1/2 25.05.2010 10:51:23 - - - Meridian
0x224188 Waiting 0 Transfer points - 2/2 25.05.2010 10:51:23 - - - Meridian
0xDCB0E0 Complete 0 Converting images: task 4 of 4 25.05.2010 10:36:35 25.05.2010 10:52:00 RAZUVANOVANG - Meridian
0x430F4E Waiting 0 Converting images: task 3 of 4 25.05.2010 10:36:35 - - - Meridian
0x3AFC6E Waiting 0 Converting images: task 2 of 4 25.05.2010 10:36:35 - - - Meridian
0x622320 Waiting 0 Converting images: task 1 of 4 25.05.2010 10:36:34 - - - Meridian
Computers
Name IP-address Type Current tasks Core quantity Max tasks PHOTOMOD version
MASHA 192.168.2.14 Client 0 1 1 5.0.965
HAMMER4 192.168.2.48 Client 0 4 4 5.0.963
RAZUVANOVANG 192.168.2.116 Client 0 1 1 5.0.967
Sashka 192.168.2.16 Client 0 2 2 5.0.966
Close

The window displays information about tasks queue, client computers load and allows managing the tasks execution.

The window is divided into two parts: the upper group **Tasks** contains the table with the tasks list and a toolbar for managing the tasks; the lower group **Computers** contains the table with list of participating computers (Clients, Monitors) and a toolbar for managing the computers.

Screen contents are updated automatically every few seconds.

15.5.1 Control of tasks list

The **Tasks** group contains the table with the tasks list and a toolbar for managing the tasks. Each task has the following attributes:

- **ID** - unique identifier for each task.
- **State** - The status of the task: waiting; paused; performed (in this case shows the percentage of task completion); complete; failed.
- **Priority** – priority of the tasks (integer, the larger the number, the higher the priority, the tasks of higher priority are performed in the first place).
- **Name** – type of task and number in tasks list.
- **Created at** – the date and time of posting task.
- **Started at** – the data and time are displayed for started task.
- **Executor** - for started task – the name of Client computer, which executes it.
- **Est. time left**– the approximate time before complete processing tasks.
- **Profile** – active Client profile at the time of posting of tasks. This profile must be network and connected to other Clients in order that they have been able to execute the tasks.

The list can be sorted by each field (by clicking on the name field).

If during the task execution an error occurs on any of network computers, it's highlighted in yellow in the list. In this case attempts will be made to perform the same tasks on other computers. The task will remain in the queue with a **Failed** state until it is deleted manually, if no computer in network is able to execute this task.

There are following operations on the tasks, which are implemented by the toolbar buttons:

Button	***Operation***
	Start selected tasks. In order to start selected tasks a Client must be chosen in a list of the Computer field (at first the **Starting** caption appears in the **State** field, and then the progress bar indicating the progress of the task being executed in percents). In this case, priority will not be counted - the selected tasks will be performed consistently according to the list.
	Paused selected tasks (the **Paused** caption appears in the **State** field)
	Stop selected tasks – completely stops the execution of task (the **Failed** caption appears in the **State** field).
	Reset selected tasks state (the **Waiting** caption appears in the **State** field)
	Auto run tasks – automatic distribution of tasks in the queue (according to priority) between the Clients and launch of the tasks. I.e. "All tasks - all connected Clients" mode is implemented. Startup mode is saved.
	Increase priority of selected tasks by 1
	Decrease priority of selected tasks by 1
	Delete selected tasks

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	Delete completed tasks
	Delete all tasks

15.5.2 Computers management

Computers group contains the list of computers, which are currently in the network and configured with the same Server.
For each computer, following parameters is displayed:

- **Name** – the network computer name.
- **IP-address** – IP-address of the Client or the Monitor
- **Тип** – The Client or the Monitor
- **Current tasks** – tasks number of distributed processing, which currently performed by Client.
- **Core quantity** – the total quantity of Client CPU's cores.
- **Max tasks** – the maximum quantity of simultaneously running tasks specified during the Client configuration (see chapter Modes and settings).
- **PHOTOMOD version** – the PHOTOMOD build number for control of compatibility. It is recommended to use the same RHOTOMOD build on all computers working with the same **Synchronization folder**.

The list can be sorted by each field (by clicking on the field name).

In the case if the computer is disconnected from the distributed processing, it's highlighted in red in the list.

The toolbar allows user to perform the following operations:

Button	***Operation***
	Allow selected computers to execute new tasks
	Forbid selected computer to execute new tasks
	Increase maximum number of simultaneously running tasks by 1. Maximum quantity of tasks are less than or equal to the number of CPU's cores of computer.
	Decrease maximum number of simultaneously running tasks by 1. Maximum quantity of tasks are less than or equal to the number of CPU's cores of computer.
	Hide disconnected computers (highlighted in red) - delete from the list.
	Display connections of type “Client” – display the list of all connected and disconnected Client computers.
	Display connections of type “Monitor” – display the list of all connected and disconnected Monitor computers.

The group of computers is selected in the list using the **Ctrl** and **Sift** buttons.

15.5.3 Performing of tasks

Tasks processing control is also carried in the **Tasks** list of **Monitor for distributed processing** window. The table contains time of start for each task, executor (Client working on the task), and estimated time left till the end of processing, in the corresponding columns. If completed successfully, the **Completed** caption appears in the **State** field. The completed

tasks can be removed from the list using the tool. The tool is used to delete all the list tasks. It is possible to start the uncompleted tasks for process again. The most common reasons for the task execution failure are its abortion using the button, Client or Server disconnection during the execution or user break of the procedure from the processing control windows.

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